

WOODLOT MANAGEMENT HOME STUDY COURSE



MODULE 4 WILDLIFE AND FORESTRY

PREFACE

The maintenance and improvement of wildlife habitat is a priority of the Nova Scotia Department of Natural Resources. In keeping with the Department's Wildlife Policy (1987), this module encourages landowners to conserve wildlife habitat on their woodlots. Knowledge of both wildlife and forestry is essential to this process. We recommend all other Home Study modules in this series to increase your understanding of woodlot management.

This module is divided into four lessons:

LESSON ONE: Understanding wildlife on your woodlot

LESSON TWO: A woodlot plan for forestry and wildlife

LESSON THREE: Managing for wildlife diversity

LESSON FOUR: Managing for individual wildlife species

The first three lessons contain a True and False Quiz to help test your understanding of the material. At the end of each lesson you will also find a list of further reading materials. Many of these materials are available free from the Department of Natural Resources (Extension Services Division). A glossary at the end contains definitions for terms used throughout the manual.

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LESSON ONE
UNDERSTANDING WILDLIFE ON YOUR WOODLOT

INTRODUCTION

Small woodlots make up 52 per cent of Nova Scotia's forests. This means that many animals depend on woodlots like yours for survival. The decisions you make for woodlot management can help or hurt many animals. This lesson will help you understand the basic concepts of wildlife habitat and management and **why** woodlots are important for wildlife.

What are the Benefits of Wildlife?

Properly managed forests can produce many wood products and encourage wildlife. Most Nova Scotians are proud of their province's beauty. They feel a "connection" with the land and its wildlife. A well managed woodlot offers an interesting environment for everyone. It also ensures a healthy forest for future generations because encouraging wildlife has ecological, recreational, and economic benefits.

Ecological benefits

Forests are communities where plants and animals depend on each other for survival (a forest ecosystem). Humans are part of this ecosystem (Figure 1) and depend upon the plant world for survival.

Plants:

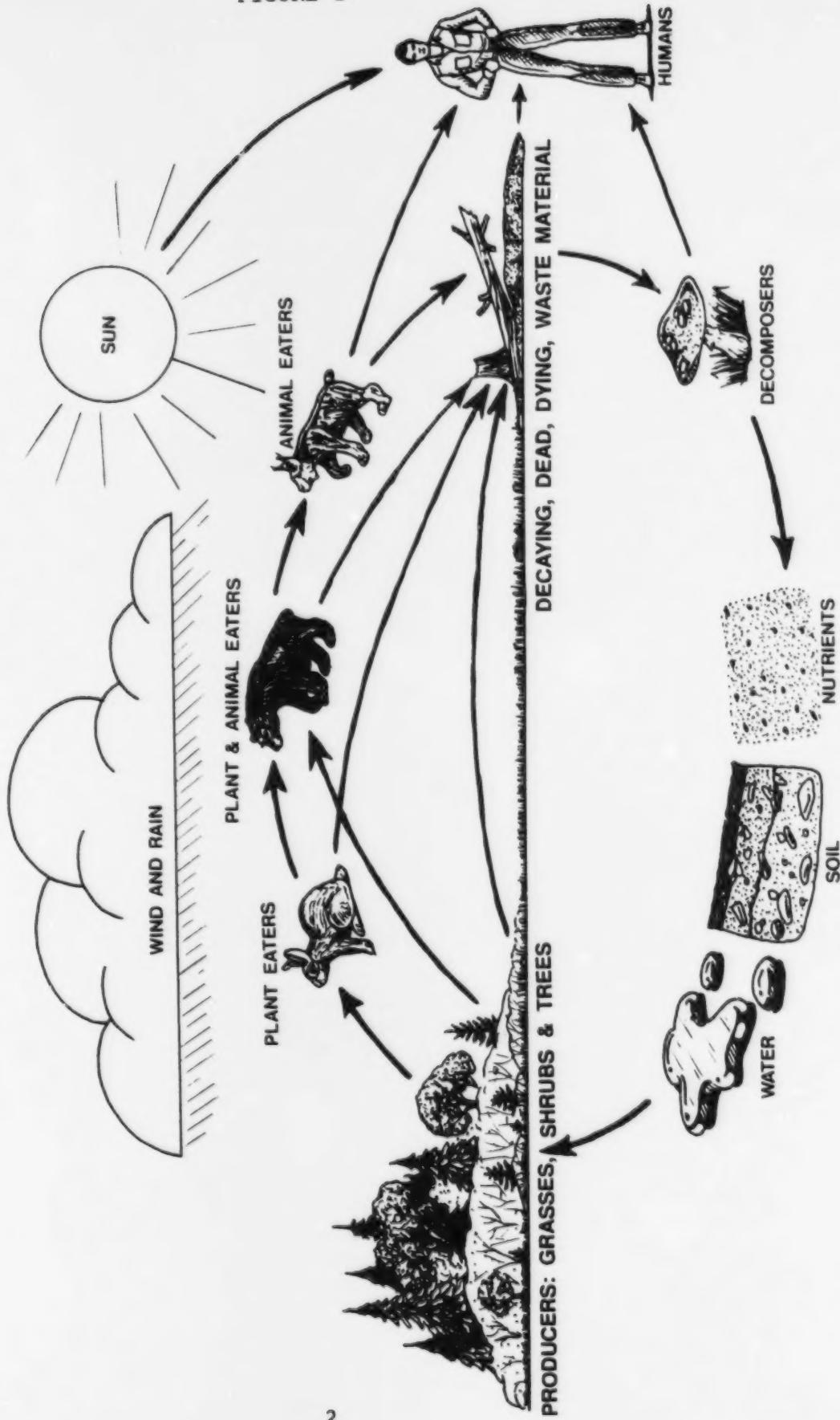
- * release oxygen into the air
- * add moisture to our climate
- * moderate weather extremes
- * fertilize soil
- * prevent erosion
- * stabilize water levels in the soil
- * provide food and shelter for humans and wildlife

Animals:

- * are an important part of complex food chains
- * microscopic animals decompose plant material to produce nutrients necessary for the growth of new plants
- * plant seeds by burying or dropping them. Animal droppings (scat) often contain undigested seeds which are deposited in a natural fertilizer.

ENERGY FLOW IN A FOREST ECOSYSTEM

FIGURE 1



- * help control insect populations. A study in the United States indicated that a flock of 260 evening grosbeaks (birds) consumed nine million spruce budworm larvae in 55 days.

Recreational benefits

When surveyed by the federal government in 1987, 85% of Nova Scotians felt that maintaining abundant wildlife populations was important. Ninety-three percent of survey respondents participate in wildlife related recreational activities each year.

Wildlife provide many recreational opportunities:

- * hunting
- * fishing
- * birdwatching
- * photography
- * nature study

Economic benefits

- * Fish and wildlife contribute approximately 200 million dollars annually to our provincial economy.
- * Many Nova Scotians earn income from wildlife. Some of this is direct income (guiding, trapping); some is indirect (equipment, meals, lodging, transportation).

Important Concepts To Understand

Wildlife refers to hundreds of different native animals including, fish, amphibians, reptiles, mammals, and birds. To encourage animals on your woodlot, you must have a basic understanding of what they need and what affects their health and survival.

*** Animals, like people, have certain basic needs**

Each animal needs a place to live, a **habitat**. A forest can contain many different habitats. An animal's survival depends on whether certain conditions exist at specific times of the year. Food, water, shelter, and space (**habitat requirements**) in the right combination make up an animal's habitat. These requirements can vary from season to season.

*** Change affects some animals more than others**

Some wildlife species can adapt more easily to habitat change than others. Robins nest almost anywhere; eagles have very special nesting and food requirements. Therefore, changes in habitat by forestry operations affect some animals more than others.

- * **Animals require the food energy that plants produce**

All animals ultimately depend on plants for food. The food is used in different ways (e.g., they eat plants or consume animals that have eaten plants).

Herbivores: animals that eat plants, e.g., white-tailed deer - red maple.

Carnivores: animals that eat animals, e.g., trout - insects; bobcats - rabbits.

Omnivores: animals that eat plants and animals, e.g., bear - blueberry and grubs.

The interactions of these groups is often called the food web (Figure 2) or food chain.

- * **Animal populations change for many reasons**

Habitat change is one influence on the number of animals in a given area. **Birth rates** (the number of young produced, usually over a one-year period) are often affected by habitat changes.

Others factors may limit or decrease numbers. Animals die for many reasons, including disease, starvation, bad weather, increased killing by other animals (including man), fire, and parasites. For example, there may be ideal trout habitat on a stream, but if an extremely hot and dry summer occurs, the trout numbers may decrease.

- * **There is always an upper limit to the number of animals an area can support**

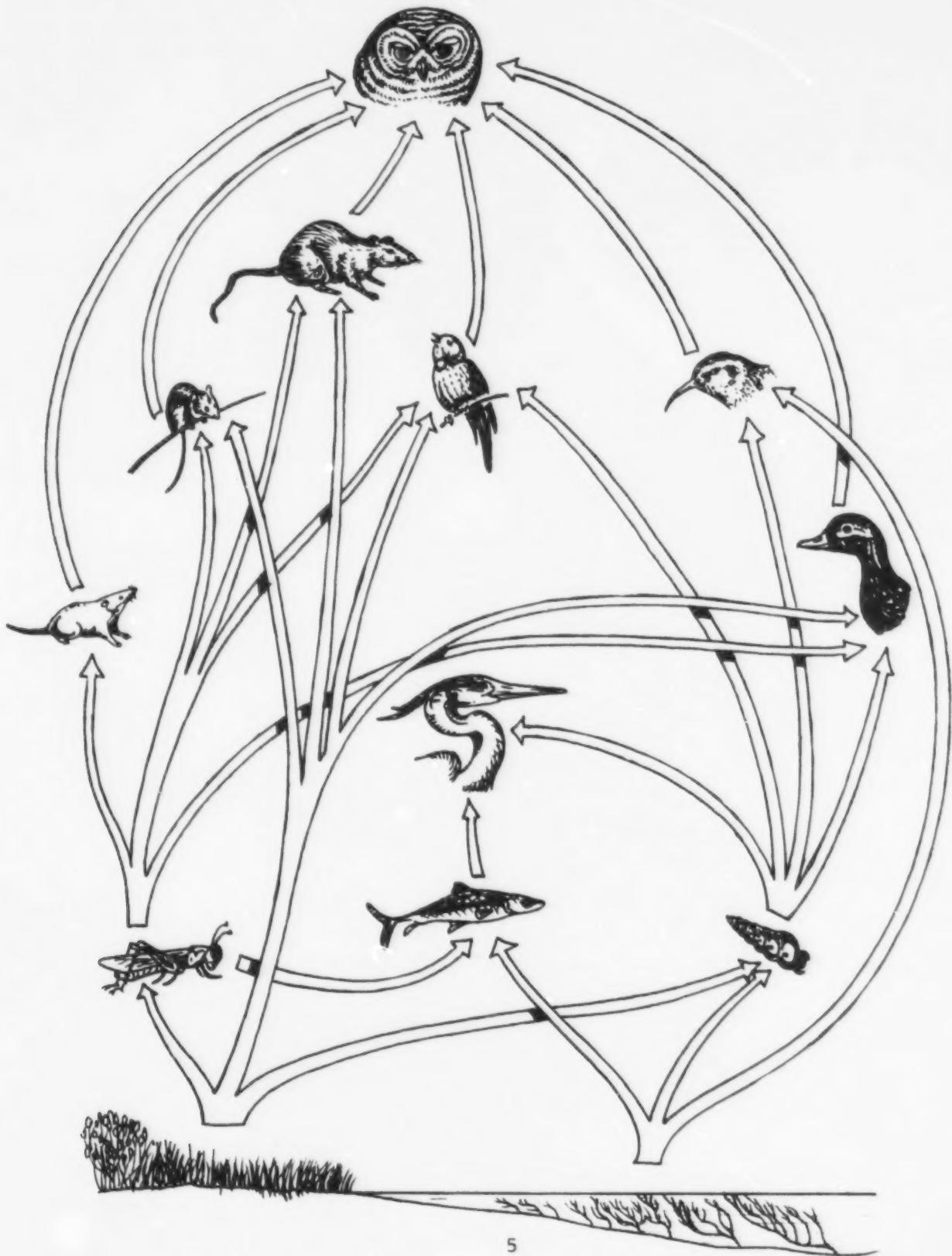
Territory describes the space animals need in which to live and rear young. It strongly influences the numbers of animals you will find on your woodlot. A chipmunk may live most of its life on a hectare (2.5 acres) while a moose may require several square kilometres (more than a square mile).

Many animals defend a territory ensuring sufficient life requirements for themselves and their young. Scientists believe that much of the springtime singing of songbirds is a way of marking out and defending a breeding territory. The size of a territory can also change with the seasons.

There are limits to the numbers and species of plants and animals that a given area can support. When animal populations exceed these limits, they can "eat themselves out of house and home". Scientists call this limit the carrying capacity.

FIGURE 2

A TYPICAL NOVA SCOTIA FOOD WEB



* Animal populations have special roles in the forest community

Every animal population has some function in the forest community. The role or occupation of each species is called its niche.

Some species have a very broad niche, using a variety of habitats and feeding on many plants and/or animals; others are more specialized. For example, the woodcock has a long sensitive bill adapted for probing the earth for worms, which make up the bulk of its diet.

Robins also eat earthworms, but are not as specialized as woodcocks; i.e., they have a more varied diet. No two species in a community occupy precisely the same niche. When niches overlap, some competition between different wildlife species will occur. This inter-relationship between animals, plants, and their niches can change the make-up of a forest community.

* A forest community is constantly changing

Plant communities are combinations of plants that grow in certain locations and change over time for many reasons. Climate, soil, and drainage are the three most common reasons. Succession occurs when one plant community is replaced by another. Figure 3 offers an example of how forest succession occurs in Nova Scotia.

* Animals use different stages of the forest

Some animals will use only a particular successional stage of a forest. For example, the pileated woodpecker (our crow-sized woodpecker, black with a red head) lives in forests that are old and decaying. Other animals such as the white-throated sparrow may be present in many different stages. As the forest changes through succession or disturbance (fire, cutting), the types of animals that use it will also change (Figure 4).

* Animals are influenced by forest type and arrangement

Land is classified by the kinds of vegetation, soil, and climate found in a particular area. A stand is a group of trees with similarities in age, species, height, and density. A forestry site may have one or more stands of trees. When succession occurs on a woodlot, stands are formed.

A woodlot with many different stands has more diversity or variety than one with only a few stands. An area is considered to be rich in wildlife when many different animals use it. A diverse environment is more stable and can withstand more change.

NOVA SCOTIA FOREST SUCCESSION

An example of species changes with time on one site

FIGURE 3

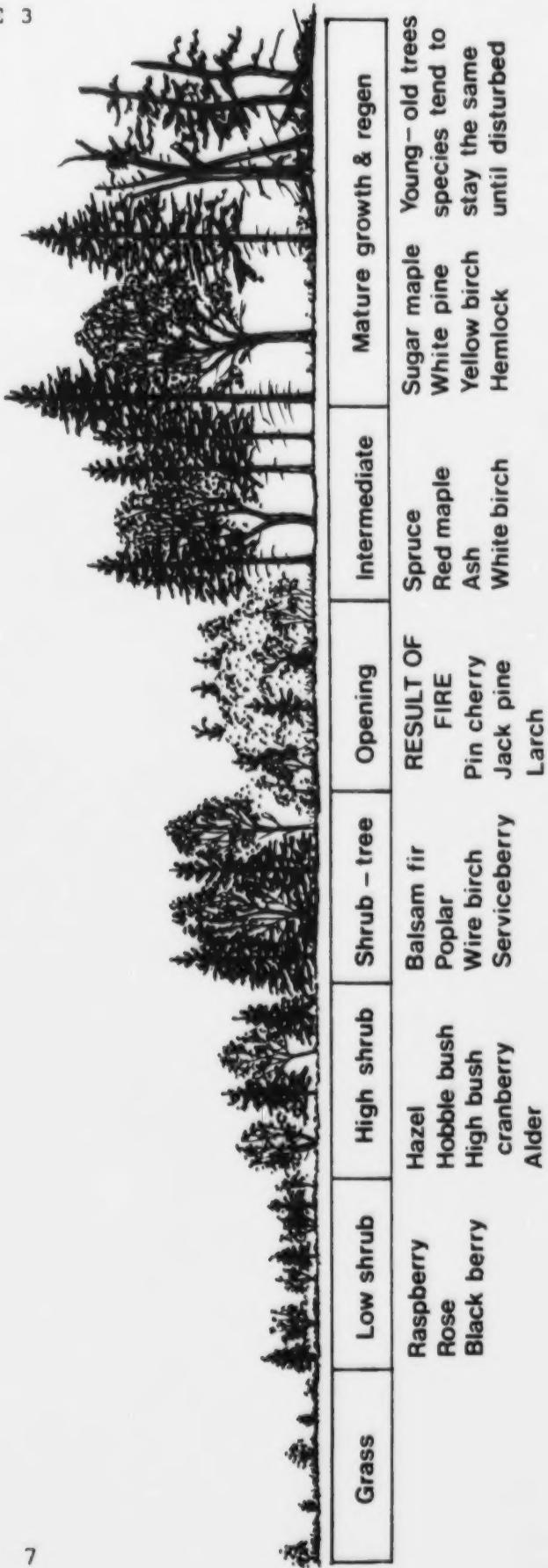
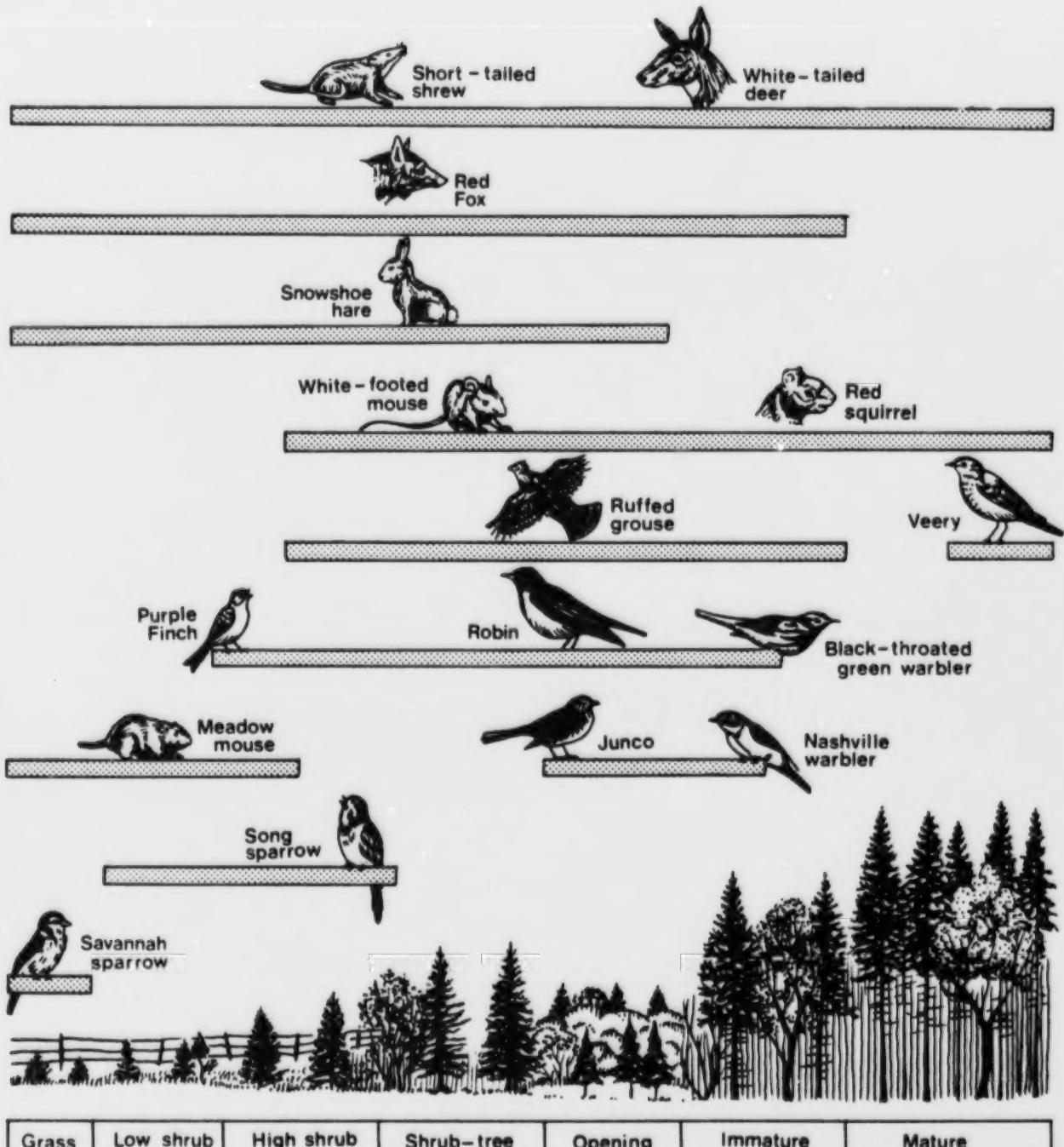


FIGURE 4

WILDLIFE USE OF FOREST STAGES IN NOVA SCOTIA



Bars cover areas where species are normally found.

* **Edges or borders are important for animals**

An edge is created where two stands or two successional stages meet. Thus, the meeting of a spruce stand and an aspen stand creates an edge. The border between a forest and an open field or waterway also creates a natural edge (Figure 5). Edges can also be created by forestry practices. The creation of edge through forestry operations is an important concept in providing habitat for wildlife.

Generally, edges offer the most choices to animals for their habitat requirements.

Planning for Variety on Your Woodlot

Aldo Leopold, a forester and conservationist, once said "the first rule of intelligent tinkering is to save all the pieces."

Aiming to manage a woodlot for diversity or variety means that you will keep many species of trees at different stages and maintain as many "pieces" of your woodlot as you can. In many instances, you can improve the amount of diversity on your woodlot and add new elements by the forestry work that you do.

Forestry and Wildlife Management in Nova Scotia

In Nova Scotia, many agencies plan and implement forestry and wildlife management. Below we outline some of these agencies and their responsibilities.

Provincial Agencies

Department of Natural Resources

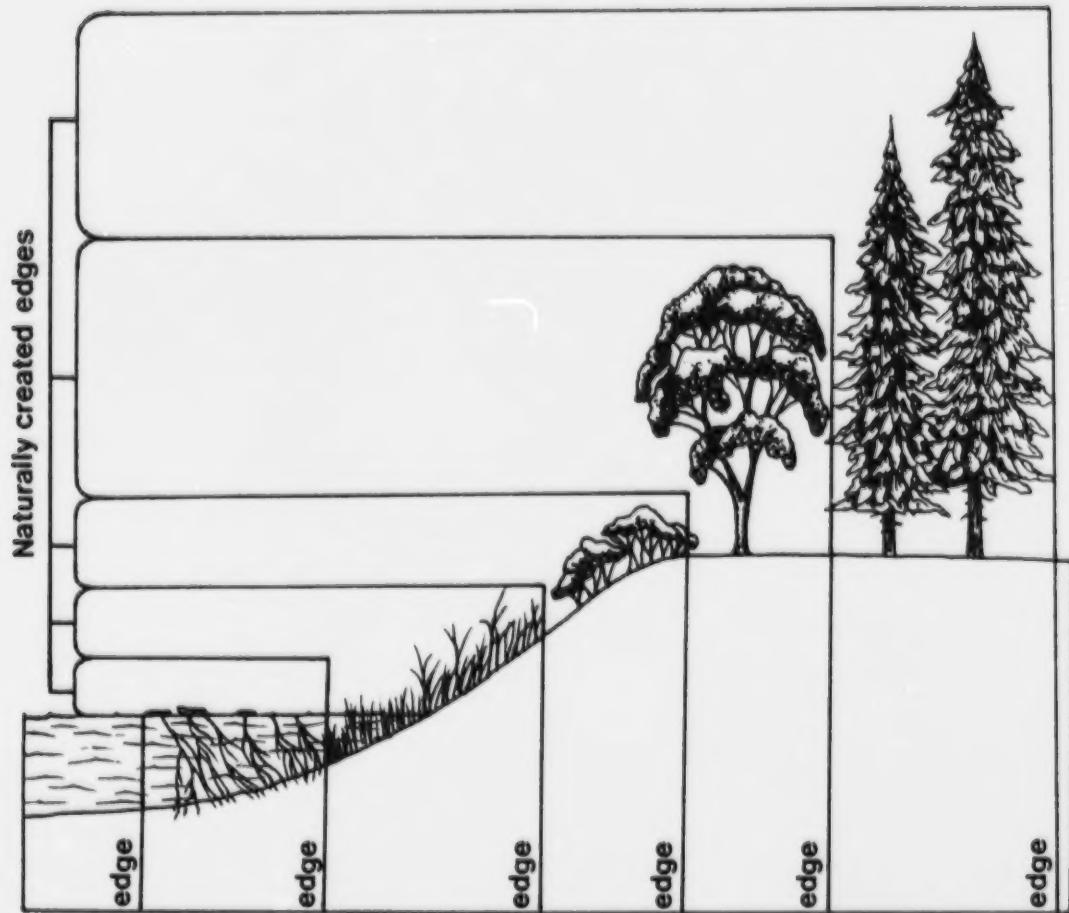
- * manages Crown lands; provides a system of parks; and protects the forests, wildlife, and beaches
- * responsible for the productivity of the forests, generally; the supply of forest products; the conservation of water; and the enhancement of recreational and scenic values

Department of Fisheries

- * responsible for fisheries training; industrial development and financing; development and regulation of aquaculture; delegated administration of selected fisheries; and in-province plant inspection and fish buyer licensing

FIGURE 5

FOREST EDGES



Naturally created edges

Department of the Environment

- * responsible for the preservation and protection of the environment
- * deals with all aspects of pesticide use, stream crossings, and watercourse alternation

Nova Scotia Museum

- * education, information and presentations that deal with the human and natural history of Nova Scotia

Federal Agencies

Forestry Canada

- * administers forest development agreements negotiated with the provinces
- * undertakes and supports research, development, and technology transfer; compiles and disseminates information on forestry; monitors insect pests and diseases
- * provides assistance and advice to the forest sector and encourages employment and training opportunities
- * encourages public awareness of all aspects of the forest sector

Environment Canada

Canadian Wildlife Service

- * manages and protects migratory birds in Canada
- * cooperates with and assists the governments of each province and territory in carrying out research and management projects relating to wildlife

Department of Fisheries and Oceans

- * responsible for sea coast and inland fisheries; marine science; and administration of the Fisheries Act
- * protection of fish and fish habitat from disruptive and destructive activities
- * fisheries and oceanographic hydrographic research

Private Agencies

Ducks Unlimited

- * restoration and improvement of wetlands for waterfowl. If you own a wetland, they may be able to help you.

Further Reading:

Odum, E.P. 1959. Fundamentals of Ecology. W.B. Saunders Co.

Payne, F. 1974. Toward Integrated Resource Management. Extension Note No. 85. Nova Scotia Department of Lands and Forests.

Smith, R.L. 1966. Ecology and Field Biology. Harper and Row.

Thomas, J.W. (technical editor). 1979. Wildlife Habitats in Managed Forests: the Blue Mountains of Oregon and Washington. USDA Agriculture handbook 553.

QUIZ

TRUE OR FALSE

1. The basic requirements of habitat are: food, shelter, water and space.
2. All animals are very particular about how their habitat is arranged.
3. Predators such as the great horned owl don't have an important role to play.
4. Herbivores eat plants.
5. All animals need plants in some way.
6. You can have as many animals of a particular species as you want on your woodlot.
7. All animals use all stages of the forest.
8. One kind of edge is the border between two ages of forest.
9. Edges are one of the richest places for animals.
10. Having a diverse forest generally results in having more kinds of animals.

LESSON TWO

A WOODLOT PLAN FOR FORESTRY AND WILDLIFE

INTRODUCTION

In this lesson you will learn how to inventory your woodlot and decide how to manage it. To do this, you must first determine your goals. In Lesson One, you learned that habitat is an arrangement of water, food, shelter, and space. Now you will learn what available habitat may be on your land and its importance to wildlife.

Woodlands in Nova Scotia are varied, with softwood and hardwood forests and mixtures of the two. Once you know what is on your land, you can identify and consider forestry options. For information on other forestry options, contact your nearest NSDLF office or read other Home Study Modules.

Setting Goals and Priorities

To help you set goals, there are many questions you can ask yourself. Here are examples of those questions:

- * Do you want income from the woodlot?
- * If so, where will this income come from? Maple syrup? Fuelwood? Pulpwood? Christmas trees? Sawlogs? Trapping? Guiding?
- * What recreational activities do you like?
- * Do you prefer certain animals?

Adding wildlife considerations to your forestry management plan will take some extra time and may involve some trade-offs. Fortunately, there are many easy ways to encourage wildlife while still improving the forestry potential on your woodlot. By setting goals early, you will have a better idea of what you wish to accomplish.

Designing Your Woodlot Plan

You have several options when designing a forestry-wildlife plan.

Option # 1: Someone else draws up a woodlot plan

Joint federal-provincial funding may be available to provide a forestry management plan for your woodlot. In this case Natural Resources, private consultants, or Group Venture staff design the forestry part of your plan. First, staff will walk through your woodlot, take measurements, do a forest inventory, and create a map showing forest types. This is the time to tell them of your

interest in wildlife and that you want the plan to take this interest into consideration.

After studying your woodlot, staff will draw up a forestry plan which will be the basis for wildlife planning. Even if someone else draws up your plan, you should read through the rest of these lessons to understand the considerations used to identify beneficial wildlife areas.

(For up-to-date information on funding contact your local Natural Resources office).

Option # 2: Drawing up your own plan

The following questions will help you create a woodlot plan.

A. What is on your woodlot?

To create your own plan you need to know what kinds of plants and trees grow there, how old they are, and how they are arranged. Module 1 of this Woodlot Management Home Study Course has a section on tree identification and silvics. The Nova Scotia Department of Natural Resources also has identification booklets (listed at the end of this lesson) that can assist you.

Aerial photographs can help identify and locate stands of trees on your woodlot. To locate aerial photographs, visit your Natural Resources office where staff will help you find the correct photo numbers and tell you how they can be purchased.

B. Make a rough sketch of your woodlot.

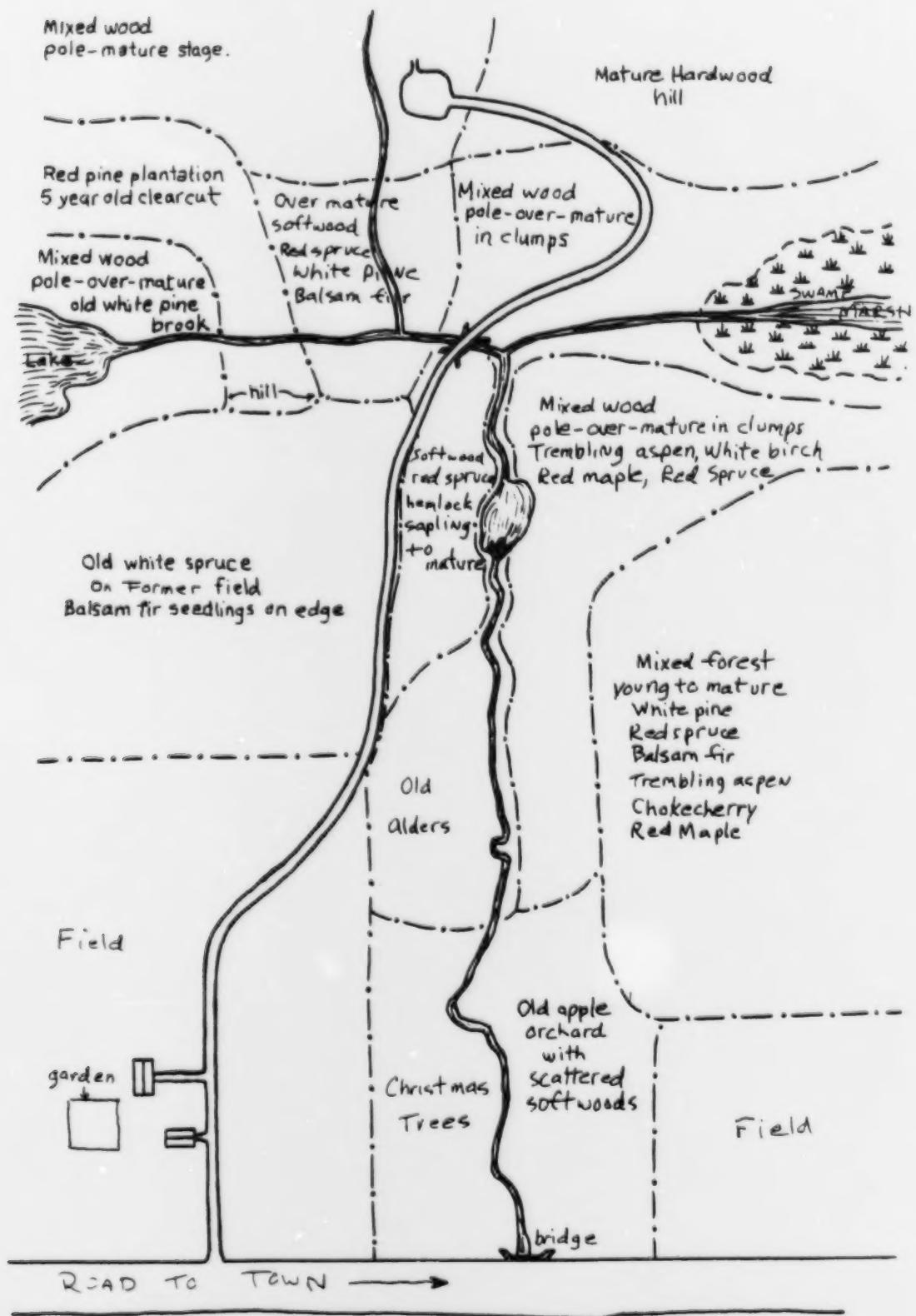
Before you begin an inventory it's a good idea to make a rough sketch (Figure 6). Walk through your woodlot with your aerial photograph(s). Identify similar groups of trees. Note their stages of growth. Mark these on your sketch. Ask yourself the following and note the answers on your map:

How much of your woodlot is made up of the following forestry stages? (Figure 7)

- a) **Forest opening stage:** Grassy areas in the forest with few trees and bushes. Deer and rabbits feed here, foxes and hawks hunt, and woodcock use them for courting. Power lines, roadsides, and fields near wooded areas can be counted as openings.
- b) **Shrub-sapling stage:** Thick areas with low woody vegetation, provide food and nesting sites for many animals. Look for trees and shrubs that are especially beneficial to wildlife (Table 1). Evergreen thickets make good winter cover for deer and other animals.

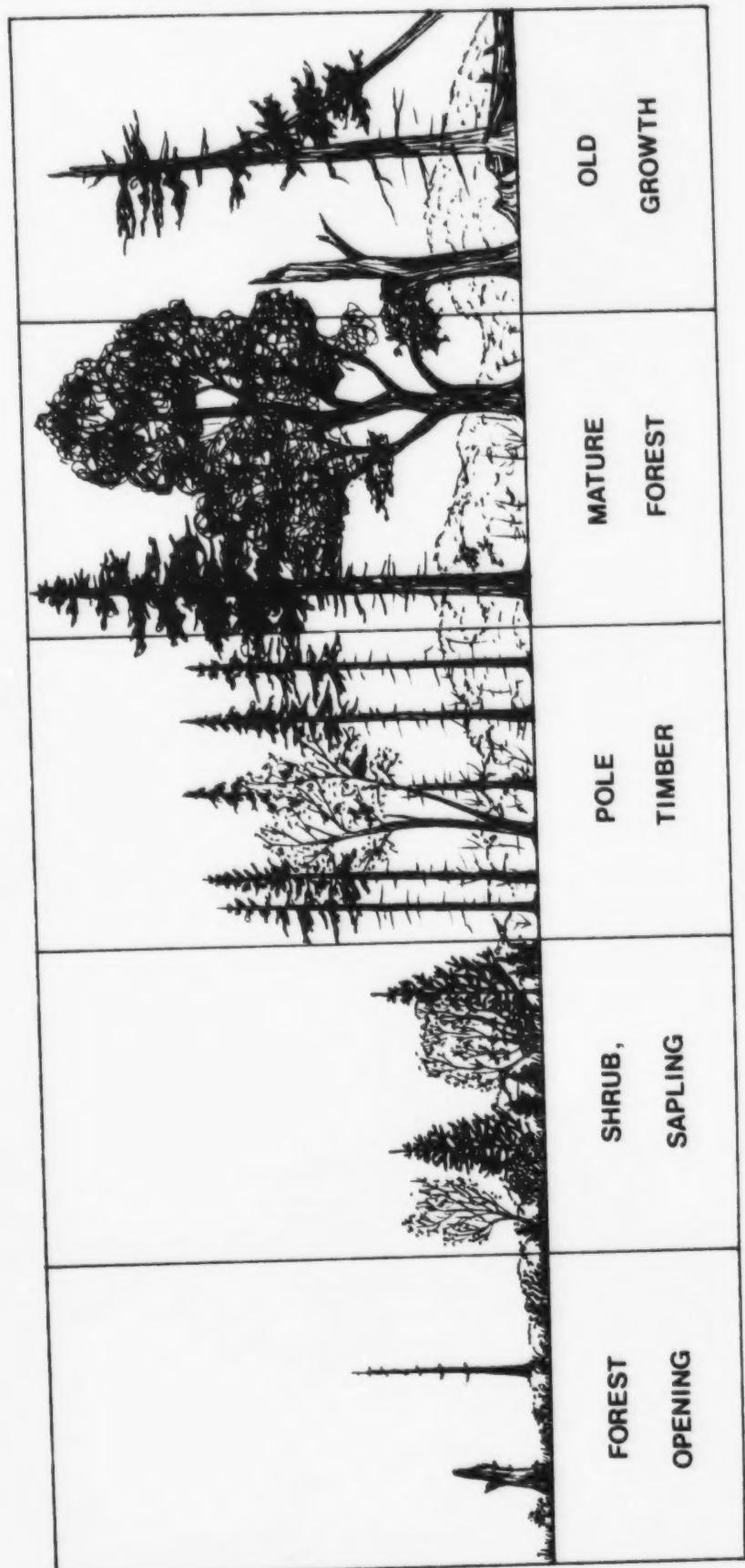
FIGURE 6

WOODLOT SKETCH



FOREST GROWTH STAGES

FIGURE 7



PLANTS AND SHRUBS BENEFICIAL FOR WILDLIFE

TABLE 1

	Range	Growth Form	Site Requirements	Importance to Wildlife
Shadbush, Indian Pear <i>Amelanchier</i> spp.	province-wide	tree-like shrub up to 20 ft. (6 m)	full sunlight, will do well in a wide variety of soil types	berries are eaten by many birds including robins & bluejays. Logs are a good winter food for moose, deer and hare.
Staghorn Sumac <i>Rhus typhina</i> L.	province-wide	tall to medium shrub 4 - 15 ft. (1 - 4 m)	prefers full sunlight or well drained to dry soils	provides food for many songbirds, the red berries stay on the bush late into the winter months.
Highbush Cranberry <i>Vaccinium corymbosum</i> Marsh.	province-wide	medium to tall shrub 8 - 12 ft. (2 - 3.5 m)	will grow in shade, but prefers full sun in fertile well-drained sandy soils.	used primarily as a substance food, eaten primarily after the berries have been frozen & thawed.
Common Elderberry <i>Sambucus canadensis</i> L.	province-wide	upright stems, less branching than Red Elderberry from 3 - 13 ft. (1 - 4 m)	prefers full sunlight on rich moist soils (prefers open areas)	reported to be fed upon by 43 species of birds, including phoebeants and immature doves.
Red Elderberry <i>Sambucus pubens</i> Michx.	province-wide	medium shrub from 3 - 13 ft. (1 - 4 m) widespread branching	prefers full sunlight on rich moist soils (forest species)	a large variety of birds feed on the fruit. A number of mammals eat various parts of the plant.
Wild Raisin, Witherod <i>Vitis cordata</i> L.	province-wide	up to 12 ft. (3.5 m)	grows well under moist soil and light conditions	consistent food source (fruit) for robins, waxwings, grouse, chipmunks & squirrels; winter browse for deer.
Red Osier Dogwood <i>Cornus stolonifera</i> Michx.	nearly province-wide, rare to absent in southwestern Nova Scotia	usually less than 6 ft. (2 m)	prefers full sunlight in moist to wet soils	small berries eaten by evening grosbeaks and many songbirds during fall migration. Squirrels, chipmunks, raccoons, & ruffed grouse also feed on the fruit, winter browse.
Brambles: Raspberry and Blackberry <i>Rubus</i> spp.	province-wide	cane-like, up to 6 - 8 ft. (2 - 2.5 m) tall, found in clumps	wide variety of conditions, depending upon the species, prefers full sunlight	thickets make good nesting sites, berries rank at the top of summer wildlife foods.
Blueberry/Huckleberry <i>Vaccinium</i> spp / <i>Corylus</i> spp.	province-wide	highly branched low to medium shrubs 2 - 4 ft. (0.5 - 1.5 m)	require well-drained acid soils, do best in full sunlight but will grow in slight shade	many forms of wildlife eat the berries in late summer. Deer and rabbits browse them freely
Highbush Cranberry <i>Vaccinium corymbosum</i> Marsh.	province-wide	small wiry bush 3 - 10 ft. (1 - 3 m) high	requires a fair amount of shade with rich, moist soils, often found in hardwood stands	tangled clumps provide safe hunting sites for many songbirds. When available, berries are eaten by grouse, squirrels, and chipmunks, good winter browse.

- c) **Pole-timber stage (Immature):** Depending on how close together the trees grow, these areas provide shelter and food, especially for birds.
- d) **Mature forest stage:** Seeds, twigs, bark, and buds from trees provide some food. Insects attracted to the trees are another food source. This forest stage is important for animals which require shelter from extreme weather (snow, cold, heat) and from predators. For example, no matter how much they eat, white-tailed deer lose weight when the temperature falls below 5 C. (40 F.). Many deer and moose will use the same shelter areas for many years. When this stage of forest is located near a food source (i.e., a cutover or shrub of sapling stage) critical shelter and food needs are being provided.
- e) **Old growth stage:** Trees begin to die and become important to many animals. Large hawks and eagles may nest in big, old trees. Pileated woodpeckers make feeding and nest holes that later become homes for smaller birds and animals. Tree lichens are important winter food for some deer. Even after the trees fall, they continue to offer important shelter, feeding, and special sites such as drumming logs for ruffed grouse.

Do you have old apple trees?

A wide variety of animals use old apple trees. In the fall, wild apples are a special treat for many animals. Areas around apple trees are a great place to locate a grouse, see a deer, or even see signs of a black bear.

Have you trees that produce seeds and nuts?

Many kinds of animals favour oak and beech trees because they are an excellent food source.

Do you have stands of aspen (poplar) trees?

Although not highly regarded in forestry, trembling and large-tooth aspen (poplar) are important for many animals. Their buds are the favourite winter food of grouse, and beavers prefer its bark.

Do you have wooded swamps?

Red maple, black ash, black spruce, and tamarack, as well as some shrubs like alder, willow, and witherod (wild raisin) can grow in wet areas and are sometimes found in clumps on high ground in a swamp. Songbirds visit each spring and deer and rabbits feed here.

Do you have patches of alders?

Considered a "weed" by many, alder thickets are habitat for many animals. Alder stands are favourite areas for grouse, woodcock, and songbirds. Alders also improve soil by adding nitrogen. They often grow in areas too wet for trees.

Are there hedgerows?

Rows of shrubs and trees between farm fields or neighbouring lands often provide an important place for animals. Grouse, pheasant, woodcock, songbirds, and small mammals will use them for shelter and feeding. Hedgerows cool the summer air and reduce winds and soil erosion. Near a recently planted forestry site, they also reduce the drying effect of wind and provide growing conditions for young trees.

Are there cavity trees or dead trees (snags)?

Cavity trees are living trees with natural or excavated holes or cavities. Snags are standing dead trees. Fallen dead trees are important habitats for many animals (Figure 8). Some people think a "park-like" forest is best for wildlife. Helping wildlife can mean your forest will not be as "park-like" as you might like.

Approximately one-quarter of all wildlife species use dead and old trees for shelter, roosting, feeding, hibernating, or nesting. These include owls, chickadees, woodpeckers, kestrels, squirrels, raccoons, and porcupines. Woodlots with snags have more wildlife species. Besides identifying existing snags, look for large live trees that will eventually die and become future snags.

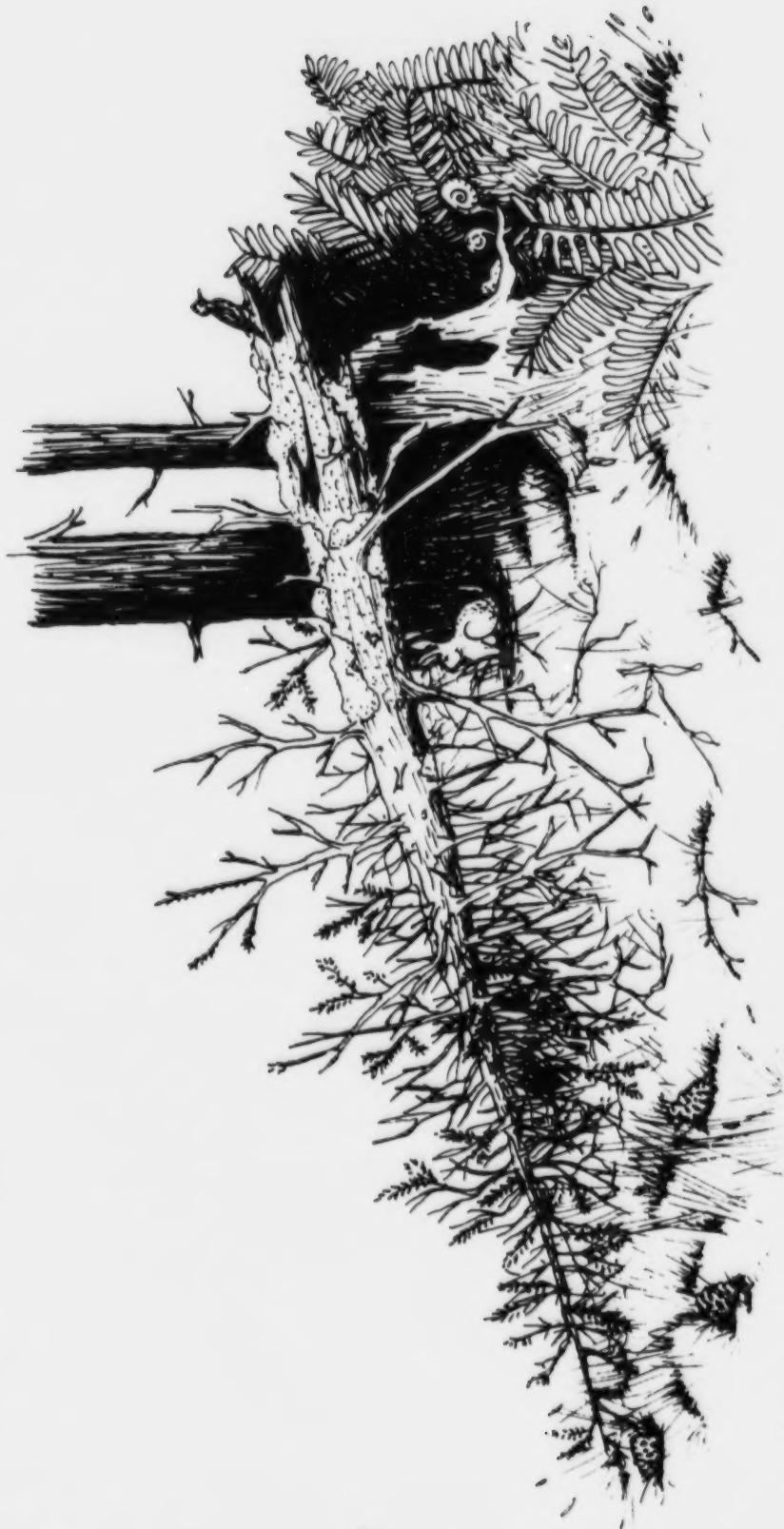
Do you have waterways?

Water has a special importance to wildlife. The areas along waterways (brooks, streams, lakes) provide habitat for many animals. Forested land along water should be considered a Special Management Zone (SMZ); a greenbelt or buffer strip for forestry and wildlife. Trees left along a waterway will help provide:

- (a) Erosion control to prevent the soil from losing nutrients and silt from entering the water. Tree roots stabilize banks by holding soil in place. As the stream flows under roots near the water, an overhang is created, providing cover for fish.
- (b) Shade to keep stream temperatures cool enough for salmon and trout during hot periods. Trout and salmon are can die if stream temperatures reach 25 C (77 F). The best summer water temperature for these fish is 16-18 C (61-65 F).

FIGURE 8

FALLEN TREES AS HABITAT



- (c) Nutrients from the forest ecosystem in Nova Scotia provide more than half of the food for fish. This is a direct result of insects falling into the water or an indirect result of leaves and branches. In general, more than 99% of all stream nutrients come from the forest.
- (d) Habitat for animals. Access to water, edge, and sheltered climate are among the many factors that make areas along watercourses excellent wildlife habitat.

Do you have marshes, swamps, or bogs?

Often considered wasteland, wetland areas add tremendous variety to a woodlot. They provide habitat for beaver, mink, muskrat, otter, and waterfowl. Four species of Nova Scotia ducks nest in holes in dead or dying trees. Deer and moose use wetlands in summer to escape flies and cool off; moose often feed in ponds and slow moving streams. Regard wetlands as an asset rather than a liability to your woodlot.

Almost three-quarters of Nova Scotia's most productive wetlands are privately owned. In addition to wildlife habitat, wetlands are important for maintaining water levels, limiting flooding and erosion, and as natural fire breaks. A forested area near a marsh or wetland further improves wetland by providing important shelter and nesting habitat.

Wildlife Inventory

By now you know what kinds of trees are on your woodlot, their ages, and how they are grouped. You have also identified special habitats such as streams and marshes. Now you are ready to do a wildlife inventory.

Some people find it useful and interesting to keep yearly written records of what they observe. These records will help you find out where and when animals were present in your woodlot. Books, such as Notes on Nova Scotia Wildlife, help by giving specific details about habitat needs of animals. There are also many field identification guides available; examples are listed at the end of this lesson. For more information, contact your local Natural Resources biologist, a bird society, naturalist organization, or wildlife association.

The following hints may help:

What animals do you see?

Don't just look for obvious animals like deer. Look for small mammals, birds, turtles, snakes, frogs, and insects.

What animal signs have you noted?

Note where and when you observe tracks, droppings, evidence of eating, nests, burrows, smells, and sounds.

What times of the year do you see wildlife?

Do you see some animals only in the summer? Why are animals attracted to your woodlot? If you see deer only in the fall near old apple trees, they're probably coming for food. If you see evidence of deer or moose in the winter, your woodlot may contain an important food or shelter area. In January and February, look for fresh beds or lays (depressions in the snow where animals have slept), tracks, browsed twigs, and droppings.

What is the history of your woodlot?

Can a neighbour or family member recall interesting facts about your woodlot? Were other animals present when you or your parents were young?

Knowing this may help you assess your woodlot's suitability for certain animals.

What kinds of habitat areas surround your woodlot?

Often this will influence what kinds of animals you will see. You can't expect to attract moose to your woodlot if it is a small wooded area surrounded by farmlands.

Are there big nest trees?

Bald eagles, hawks, owls, ospreys, and great blue herons all nest in big trees. Seventy percent of identified bald eagle nest sites in Nova Scotia are on private lands. Encouraging and maintaining these large birds is beneficial. Hawks and owls eat mice and other rodents. The presence of these large birds indicates a healthy food chain able to support many animals. If you see these birds regularly, you may be able to locate a nest tree. With great blue herons, you might find a colony of nests. Mark these sites on your woodlot map.

Now you should have a complete inventory. Add this information to your map as illustrated in Figure 9. You should have a picture of the habitat components and their spacing in your woodlot. The next two chapters will help you integrate forestry and wildlife.

Choosing a Forestry-Wildlife Management Approach

You can manage for wildlife and forestry in at least two ways:

1. manage for many animals
2. manage for specific animals

You may also decide to manage your woodlot by combining these methods. Whatever type of management you choose, it is important to plan carefully with long-term goals in mind. The changes you make will affect animals for many years.

Management for an abundance of wildlife (species richness)

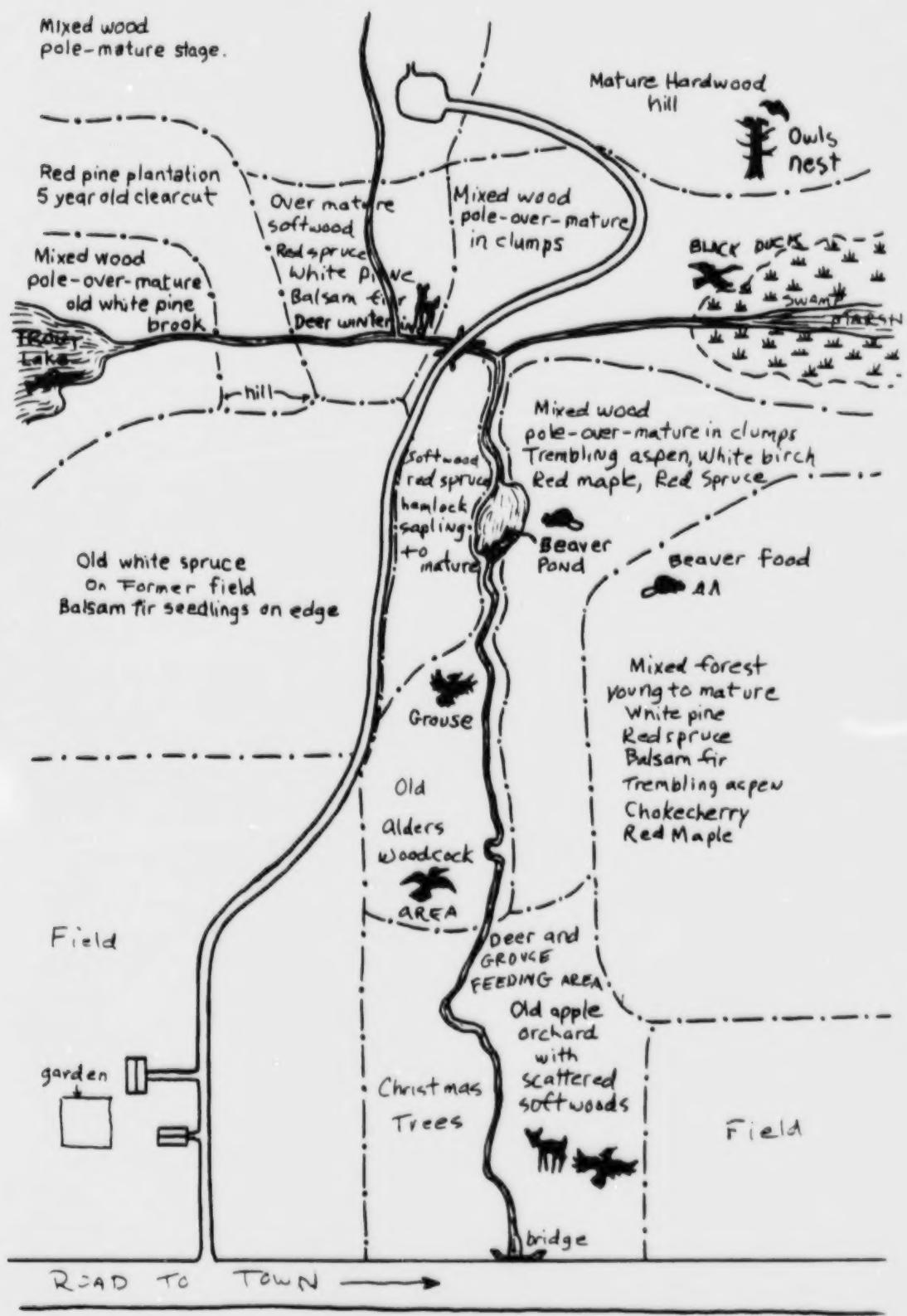
Encouraging a wide variety of animals can be done with most forestry operations. You will be developing a diverse woodlot with many kinds of plants and trees. The management options in Lesson Three will help you to do this.

Management for a specific wildlife species (featured-species)

Some woodlot owners want to encourage specific animals and are willing to modify forestry operations to do this. Lesson Four will give you some guidelines.

FIGURE 9

WOODLOT HABITAT SKETCH



Further Reading:

Notes on Nova Scotia Wildlife

Trees of Nova Scotia

Summer Key to Woody Plants of Nova Scotia

Winter Key to Woody Plants of Nova Scotia

Single copies are available free at your local Lands and Forest office or from: NSDLF, P.O. Box 68, Truro, Nova Scotia, B2N 5B8.

Banfield, A.W.F. 1974. The Mammals of Canada. University of Toronto Press.

Brown, Tom & Morgan, Brandt. 1983. Tom Brown's Field Guide to Nature Observation and Tracking. Berkley Publishing. New York.

Claridge, E. & Milligan, B.A. 1984. Animal Signatures. Nova Scotia Museum. Halifax.

Gilhen, J. 1984. Amphibians and Reptiles of Nova Scotia. Nova Scotia Museum. Halifax.

Gill, J.D., and W.M. Healy. 1974. Shrubs and Vines for Northeastern Wildlife. USDA Tch. Report NE-9. USDA Forest Service, Northeastern Forest Exp. Station, Upper Darby, PA.

Godfrey, W.E. 1974. The Birds of Canada. National Museum of Canada.

Kricher, John. 1988. A Field Guide to Eastern Forests. Peterson Field Guide Series. Houghton Mifflin Co. Boston.

Murie, Loaus, J. 1974. A Field Guide to Animal Tracks. Peterson Field Guide Series. Houghton Mifflin Co. Boston.

Peterson, Roger Tory. 1980. A Field Guide to the Birds. Fourth Edition. Peterson Field Guide Series. Houghton Mifflin Co. Boston.

QUIZ

TRUE OR FALSE

1. Mature forests are very important shelter areas for animals.
2. Alders are not useful.
3. Grouse eat poplar buds in winter.
4. Hedgerows will help tree seedlings get established.
5. Logs laying on the ground have little use for wildlife.
6. One-quarter of our wildlife use dead trees and old trees.
7. The majority of Nova Scotia's eagles est on private woodlots.
8. Shade is the only reason for leaving a special management zone along waterways.
9. All ducks nest in the grass near water.
10. Your neighbour's woodlot can influence the animals on your woodlot.

LESSON THREE

MANAGING FOR WILDLIFE DIVERSITY

INTRODUCTION

Lesson One introduced diversity as a measure of the variety of plant and animal communities in an area. In Lesson Two you completed a forestry, wildlife, and habitat plan of your woodlot. In this lesson you will learn how to manage your woodlot to encourage many wildlife species.

Diversity is partly a reflection of natural woodlot characteristics, such as soil fertility, wetlands, and terrain. Diversity can be increased by modifying silvicultural practices to provide a broad range of habitats. When planning forestry operations consider the timing, type, size, and shape of the cuts and the successional stages which will be present after you are finished.

Managing Different Forest Stages for Wildlife

The presence of early and late successional stages plays an important role in forest diversity. By having a woodlot with varied ages and types of trees, you can maintain or improve the mix of habitats for wildlife. Look at each of the forest stands and those nearby. Visualize the different habitats that your forestry operations will create. Here are some considerations to help you decide what to do in each of the various stages of the forest.

Forest openings:

Openings will benefit wildlife. Roadsides and push-offs can be seeded with grasses when logging operations are finished. Small patch cuts will create new openings as old cutovers grow in.

Shrub/sapling stage:

Leave small shrubs and trees that produce berries and other foods as illustrated in Table 1 on page 18. By providing more food, you encourage more animals. Many shrubs can be transplanted from the wild in early spring. Shrubs and sapling size trees are the most important stage for browsing animals.

Pole timber stage (immature):

Although this stage is not used by as many animals, it is important because it will provide habitat as trees grow older. Thinning or cleaning can encourage the growth of many kinds of trees. Use the brush created from these operations to make

brushpiles as shelter areas for small animals such as rabbits. Place large material at the base of a brushpile and cover it with smaller branches (Figure 10). Locate brushpiles near food or water sources. Brushpiles will also decompose and add valuable nutrients to your soil.

Mature forest stage:

This stage is important for winter shelter. Depending on the animal, shelter can take many different forms. If animals are using it, modify your cutting in these areas. As an example, cutting guidelines for wintering deer are suggested in Lesson Four. Mature forests also produce seed crops (cones, acorns, etc.) that are important foods for wildlife.

Old growth forest stage:

These forests provide nesting and cavity trees. Individual old growth trees scattered through the woodlot also provide valuable habitat. Between 3% and 8% of a woodlot should be left as old growth. For more information, see the section on snags and cavity trees later in this chapter.

Considerations for Special Trees

Apple Trees:

Wild apple trees can be made more beneficial to wildlife (Figure 11).

Trees that produce nuts or acorns:

Try to save healthy oaks, beeches, and hazelnuts. Encourage their growth by carrying out the steps outlined in the wild apple tree brochure. Planting or maintaining a tree for wildlife can be a family activity and one which children will enjoy.

Aspen trees (poplar):

Stands of trembling and big-tooth aspen or poplar can be managed for a variety of animals by select and patch cuts as outlined in the ruffed grouse section of Lesson Four.

Wooded swamps:

If extraction is feasible (by winching or dragging logs out) a small amount of fuelwood cutting (select or patch cuts) will benefit animals. New tree growth will provide valuable food sources.

FIGURE 10

BRUSH PILE CONSTRUCTION



finer, small
material
on top



medium-sized
material
in middle

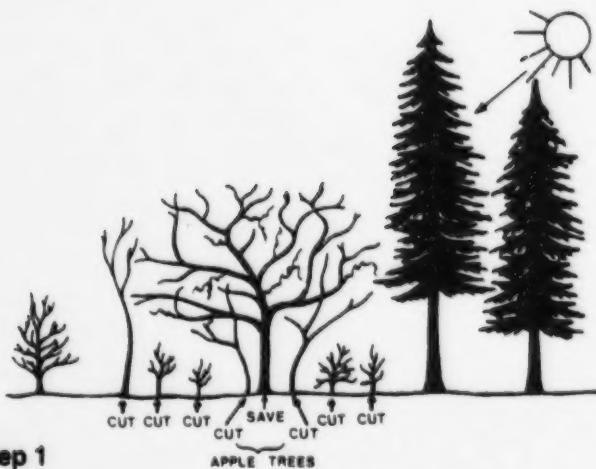


larger
material
on bottom



FIGURE 11

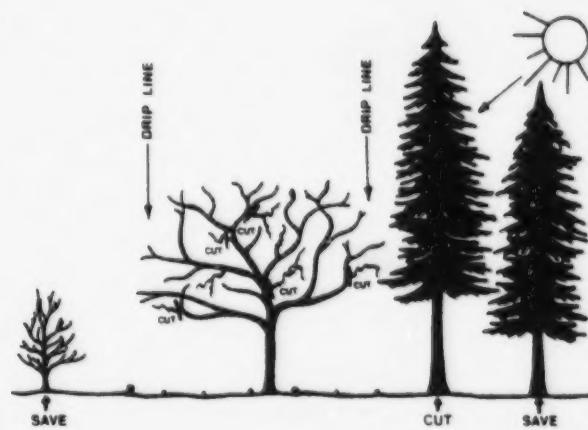
IMPROVING WILD APPLE TREES FOR WILDLIFE



Step 1

Remove competing understory out to drip line.

Examine the tree to find dead branches, diseased wood, and multiple stems. If there is more than one stem, select the largest and/or most vigorous. Remove the smaller competing stems, cutting them off as close to the trunk as possible. If the largest stem is diseased or broken, select the next most vigorous one. All shrubs and other trees should be removed back to the edge of the "drip line" of the tree.



Step 2

Remove dead branches and over-shadowing trees.

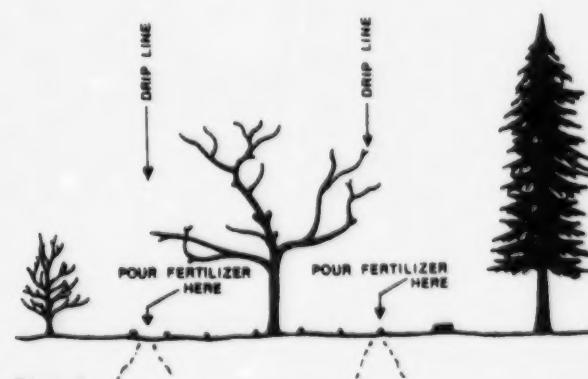
If the tree is shaded by nearby trees, remove these on at least three sides, especially toward the south. Then, using a pruning saw or pruning shears, cut away all dead branches on the apple tree as close to the living branches as possible.



Step 3

Prune tree to stimulate new growth.

Selective pruning will open up the tree. Roughly one-third of the live growth should be removed; cut away large clumps or clusters of branches. Make as few cuts as possible. Clip 0.3-0.6m (1-2 ft) from the ends of vigorous side branches or vertical sucker shoots. Do not remove the short spurs that grow out of the larger branches — these will bear fruit. If the tree is a young sapling with only a few side branches, cut off the top to encourage branching.



Step 4

Lime soil, then apply fertilizer around drip line of tree.

Fertilize with calcium nitrate or ammonium nitrate by pouring the liquid in a narrow band at the drip line. Fertilizer laid in a narrow band will soon spread out as it percolates through the soil to the feeder roots. Large apple trees require about 2 kg (5 lb.) of liquid fertilizer, medium trees roughly 1.2 kg (3 lb.), and small trees and saplings about 0.5 kg (1 lb.). In the last case, apply the fertilizer 1 m (3 ft) away from the base of the tree.

WARNING: Because wild apple trees harbour the destructive apple maggot and by provincial law should be cut if within 300 metres (1,000 feet) of any commercial apple orchard, we strongly recommend that no improvement (which will foster heavier crops of infected apples) be carried out within 1.6 km (1 mile) of any such orchard.

Alder patches:

Manage alders for wildlife, particularly where soils are too wet for other trees to grow. To improve alder stands, make patch cuts throughout the stand to promote new growth. For more information on alder management, see the section on woodcock in Lesson Four.

Hedgerows:

Leave natural hedgerows on your property and encourage their growth. Consider planting a hedgerow between fields or near your home. The best hedgerows have shrubs and trees that produce food (berries, seeds, or nuts). Nestboxes and bird feeders placed close to hedgerows will provide birds with additional nesting and feeding areas close to shelter.

Large nest trees:

Nest trees are easy to locate and identify during the breeding season in spring and early summer. If you find large nests at other times of the year, wait until spring to make a positive identification when the birds have returned. The major consideration when operating around nests is to avoid activities during the breeding season. Management guidelines for specific birds (eagles, hawks, blue herons) are in Lesson Four.

Managing Snags and Cavity Trees

When deciding whether to leave snags and cavity trees, consider:

What kinds of trees to leave:

- (a) Snags less than 10 cm (4 in.) d.b.h. (diameter breast height) or less than 2 m. high are of little use to wildlife. The best snags are 25 cm. (10 in.) d.b.h. or greater.
- (b) Trees that are large and long lasting provide the best habitat. The best species are beech, sugar maple, yellow birch, white pine, red oak, and hemlock. However, almost any old tree will be useful.
- (c) Look for trees with existing cavities, fungal conks, rotting branches, old wounds or scars, and dead branches or tops.

How many trees to leave:

Leave a minimum of 10 trees per hectare (4 trees/acre), but not necessarily in each hectare. Animals will often use these trees more if they are left in clumps. Try to leave a mixture of tree species.

Where to leave them:

- (a) Don't leave snags where they could fall and hurt someone; e.g., near landings where there is a safety hazard. Dangerous trees should be felled and left on the ground. On a slope, felling across the hill rather than up or downhill will provide more shelter.
- (b) Don't leave snags (particularly, hardwoods) on hilltops Lightning may strike and start a forest fire.
- (c) Snags left in clusters provide more shelter and feeding opportunities for wildlife.
- (d) Clusters of snags are best located along edges or in SMZs along watercourses.
- (e) Leave cavity trees and snags in all stages of forest growth.

Managing a continuous snag supply:

Leave live, older trees to become future snags. These trees can be left near existing snags. For example, you may cut a mixedwood stand and leave a group of hardwoods along the edge of your clearcut. In this group of hardwoods there may be some dead and some live trees. The dead trees will be utilized by cavity users. By the time these trees fall, the live trees will be dying and will replace the previous cavity trees.

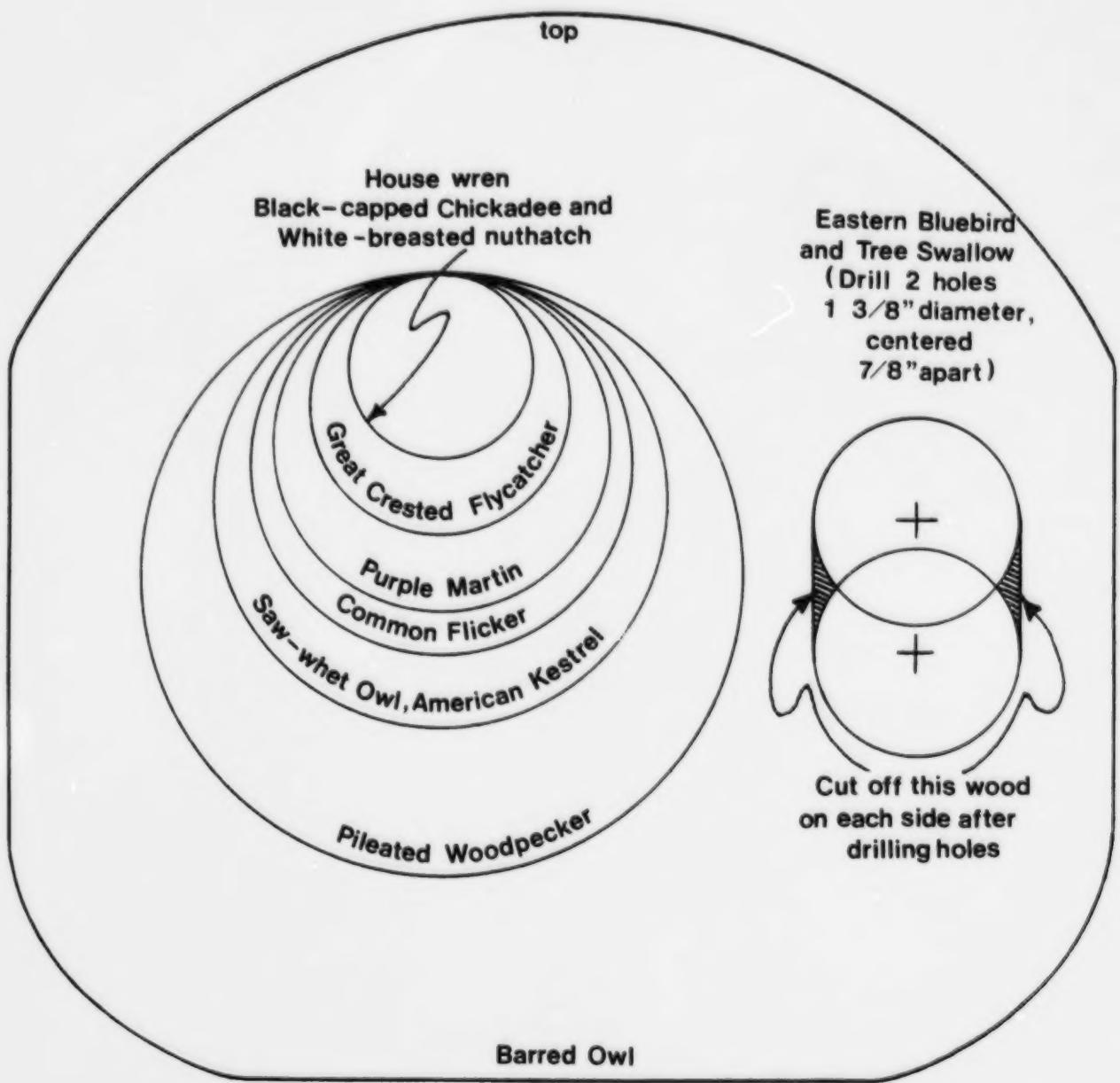
Managing if you do not have enough snags:

- (a) Live trees can be girdled or stripped of their bark (with a chainsaw or axe) so they will die.
- (b) You can create habitat for cavity users by making nestboxes. Nestboxes are easy to make with scrap lumber and are used by many animals. The size of the box and diameter of the hole varies for different animals (Figure 12 - 14 and Table 2). All nest boxes should be cleaned each year in late fall or early winter.

FIGURE 12

ENTRANCE HOLE SIZES FOR SOME BIRDS THAT USE NEST BOXES

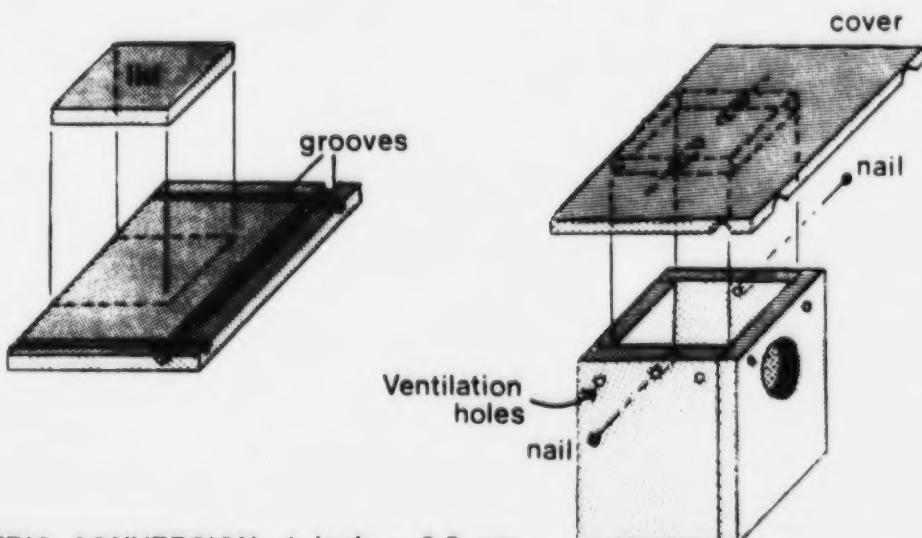
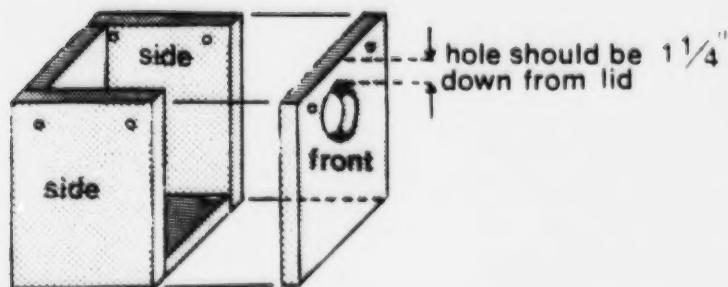
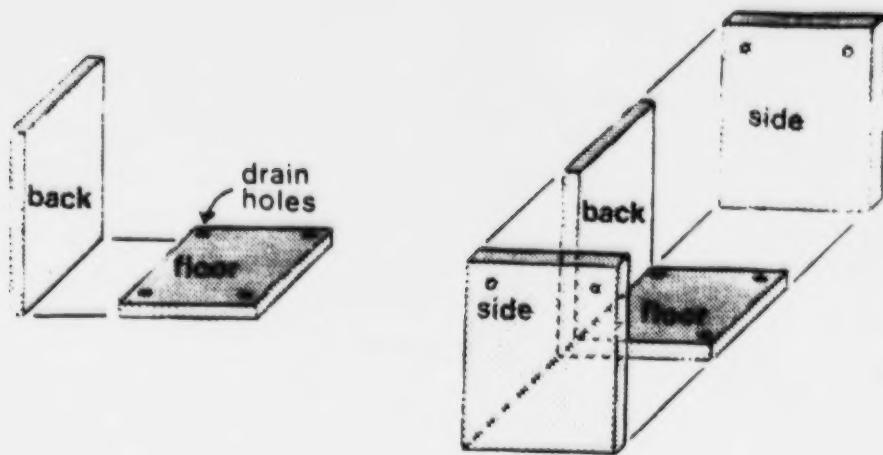
Trace onto wood using carbon paper



METRIC CONVERSION: 1 inch = 2.5 cm

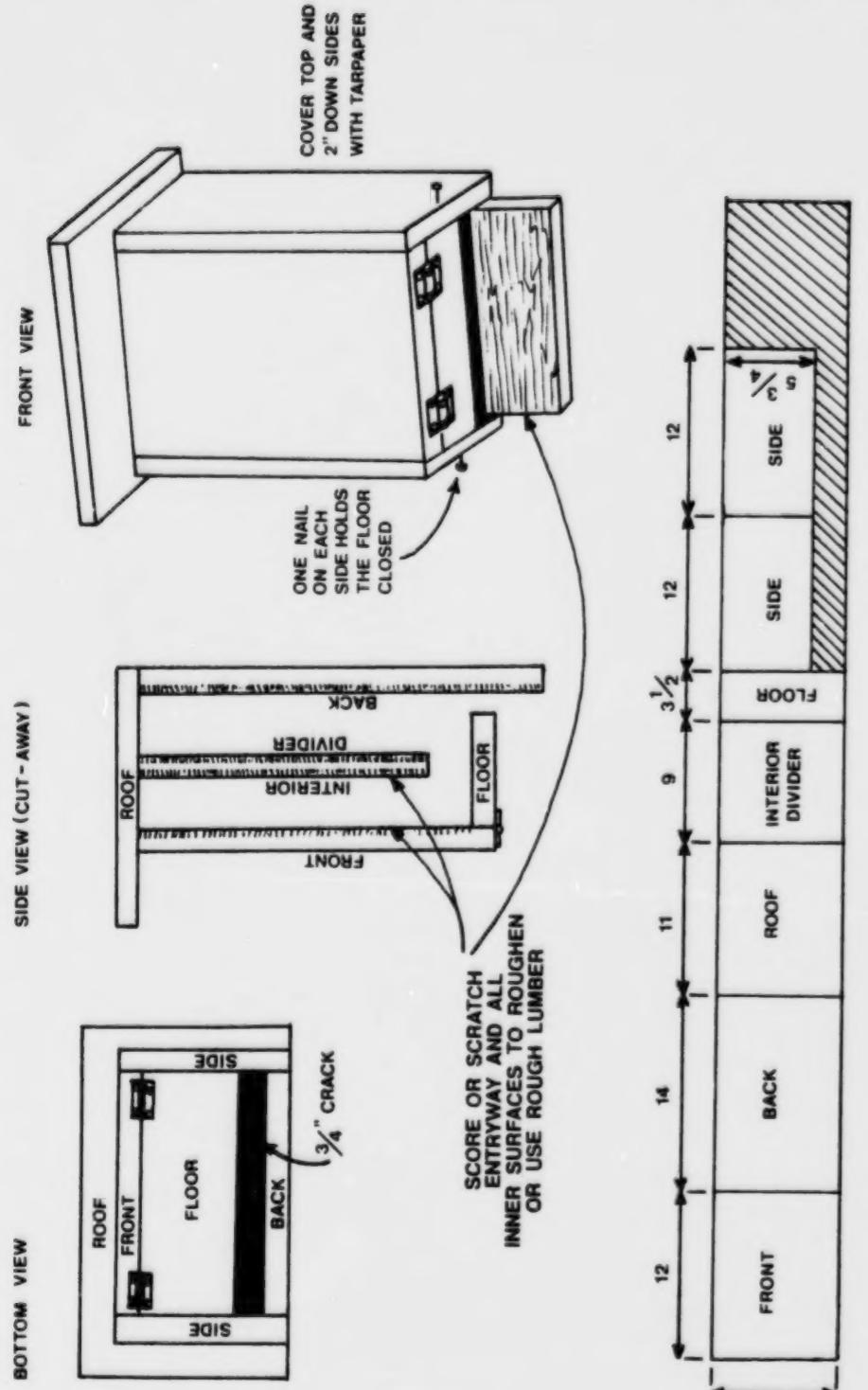
FIGURE 13

NEST BOX CONSTRUCTION

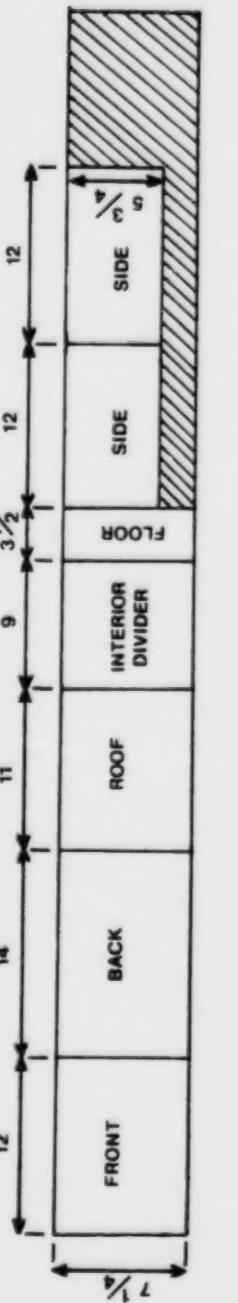


METRIC CONVERSION: 1 inch = 2.5 cm

BAT HOUSE CONSTRUCTION



METRIC CONVERSION: 1 inch = 2.5 cm



NEST BOX SIZES AND INFORMATION BY SPECIES

Species	Entrance hole diam. (inches)	Inside floor area (inches)	Height of wall panels (inches)	Min. height above ground (feet)	On pile or tree near shrubs in open areas	In woods or in open areas	No. of pairs per acre	No. of eggs in a clutch	Incubation Period (days)	Age when young leave (true nest) (days)
Chickadee	1 1/4	3 1/2 x 3 1/4	6	6	*	*	1-2	6-8	12	16
Nuthatch							5-9	12	12	18
Downy Woodpecker							4-5	12	12	24
Bluebird	1 1/2	4x4	10	7	*	*	1	4-5	12	15-18
Tree Swallow							8	4-6	14	16-20
House Sparrow							4	4-6	12	12-14
Hairy Woodpecker	2	5x5	12 1/2	10	*	*	1	3-6	14	24-26
Crested Flycatcher							1	4-8	15	13-15
Starling							4	4-6	12-14	16-18
Purple Martin	2 1/2	6x6	15	10	*	*	50	4-5	12-16	15-18
Common Flicker							2	6-8	14-16	25-28
Saw-whet Owl							3-7	21		
American Kestrel	3	7 1/2 x 7 1/2	17	15	*	*	4-5	28		24-26
Pileated Woodpecker	3x4	8x8	12-30	12	*	*	3-5	18*	26	
Wood Duck	Oval	10x10	20	8	*	*	10-15	29	1-2	
Hooded Merganser							2	10-12	31	1-2
Common Goldeneye							10-12	31	1-2	
Barred Owl	6x6	12x10	20	20	*	*	1-4	32*	27-34	

TABLE 2

Cutting Patterns to Benefit Wildlife

Timing of cuts

The composition and age of your forest largely determines the timing of silviculture and harvesting operations. When planning cutting operations, consider:

- (a) Trees that live longer offer more options. For example, red spruce and white pine can be cut at a younger age for pulpwood, or left to become future sawlogs.
- (b) Plan harvesting over the longest possible period. This will create forest stands of different age classes.
- (c) Organize your silviculture and harvest schedules by area and year. Try to visualize your future woodlot.
- (d) Check Lesson Four for the seasonal timing of cuts for animals such as deer or birds of prey.

Type of cut

- (a) Using different harvesting methods may provide the most habitat for animals over the longest time. For example, shelterwood or selection cutting in one area and clearcutting in another, may offer more for wildlife than using one method in all areas.
- (b) Locate and retain areas that can be left for shelter for wildlife in winter. Cut firewood near softwood cover to provide a useable food source for deer.
- (c) Refer to other modules of the Home Study Course to learn more about cutting options.

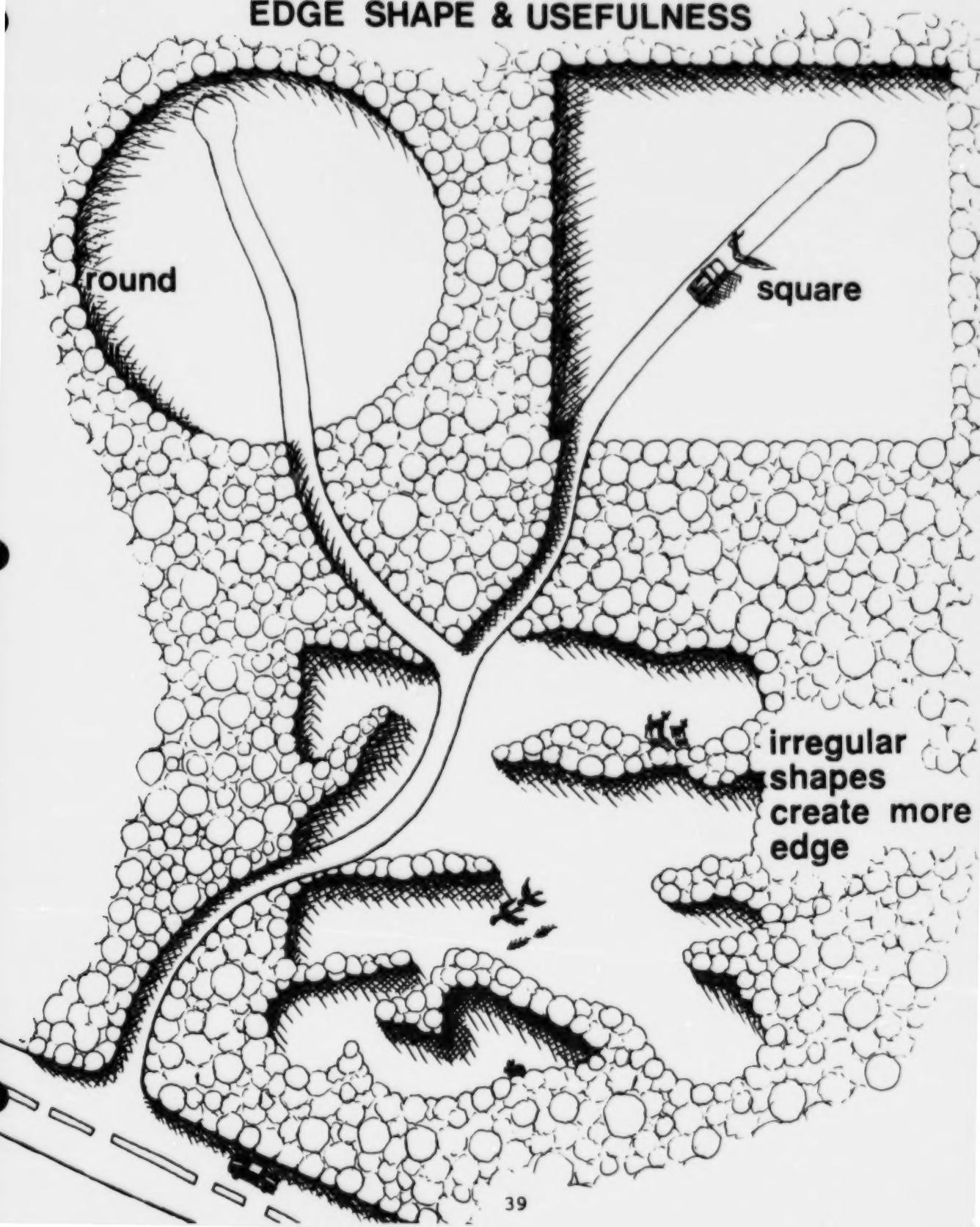
Size of cut

Ideal clearcut sizes are 1 to 10 hectares (2.5 to 25 acres). Small clearcut are more heavily utilized by wildlife than large cuts. Spacing smaller cuts over longer periods is better than cutting it all in one or two years.

Shape of cut

- (a) Cuts with uneven borders produce more edge than round or square ones (Figure 15). Edges can promote natural regeneration by providing more trees along the edge as seed sources. Edges formed where young and old forest stands meet offer food and shelter for many animals.

EDGE SHAPE & USEFULNESS



(b) Travel corridors are lanes of windfirm trees left on a site. They provide a travelling area across larger cuts for animals and act as windbreaks to reduce drying. If you plan a travel corridor, consider:

- i. corridors should be 50 to 70 metres (160 to 230 feet) wide.
- ii. place the corridor so that it breaks up the size of the cutover as much as possible.
- iii. corridors should connect with other uncut areas and SMZs.
- iv. when cutting in the corridor, maintain 70% crown closure (the amount of shading provided by the tree tops).
- v. when new trees in the cutover are big enough to provide cover, harvest the corridors.
- vi. corridor trees should be windfirm.
- vii. leaving hardwoods can provide a firebreak between two areas.

Special Management Zones (Greenbelts)

In the previous lesson we outlined the importance of SMZ's along waterways. They are an excellent place to leave valuable wildlife trees. In the SMZ, you can put many wildlife considerations together. Because of site differences, it's difficult to offer one general SMZ recipe. For an effective zone consider:

Source of the water:

Is it spring-fed? Does it come from a lake? The source may be important to stream temperature. For example, spring-fed streams are cooler than lake-fed streams; therefore, a lake-fed stream may need a wider SMZ to maintain the same temperature as a spring-fed one.

Stream orientation:

The direction that a stream flows affects how trees shade the water. For example, a stream that flows east-west is shaded by trees on its southern side.

Stream orientation can also affect animal use. Deer prefer banks on the northern side of streams for winter shelter. If the northern side is sloped, the winter sun will provide additional warmth.

Quality of the stream:

Does the bottom of the stream have gravel or silt? Trout need clean gravel for spawning. Does the stream have pools? Logs

and large debris that fall into streams help create pools for fish.

The banks of the stream or lake

How sensitive to disturbance is the soil near the water? Consider soil type, erodibility, how close the water table is to the ground surface, and the slope of the land. Erodible soils, wet ground, and steep slopes will require a wider SMZ. Some clay soils erode and release silt more often than others. Silt will destroy spawning areas and aquatic insects that cling to rocks in oxygen rich, fast moving streams. Also, consider the importance of wildlife, such as amphibians, near the water's edge.

Where does the water come from?

Activities upstream can affect your water quality. If you're planning stream improvements, it may be worthwhile to tell other landowners along the stream.

If in doubt, your local Natural Resources office can assist you with a SMZ. Recommendations may be found in the Forestry-Wildlife Guidelines.

Marshes, swamps, and bogs

Borders around wet areas provide important nesting sites and shelter for animals. Some woodlot owners build nestboxes to encourage cavity-nesting ducks. Refer to Table 2 (page 37) for nestbox dimensions. Many wetlands on woodlots are the result of present or past beaver activity.

Summary

The practices described in this lesson will make your woodlot attractive for a variety of animals. The next lesson will help you manage the habitats of specific animals.

Further Reading:

Forestry-wildlife Guidelines and Standards for Nova Scotia. 1988.
Nova Scotia Department of Lands and Forests.

Environmental Standards for the Construction of Forest Roads and Fire Ponds in Nova Scotia, 1983.

Single copies are available free of charge from NSDLF, N.S. Department of the Environment, or Department of Fisheries and Oceans.

Other Books of Interest

Decker, D.J., and J.W. Kelley. Enhancement of Wildlife Habitat on Private Lands. Cornell Extension Bulletin 181, 7 Research Park, Cornell University, Ithaca, New York, 14850. (approx. \$4.00)

DeGraff, R.M. Managing New England Woodlands for Wildlife That Use Tree Cavities. Cooperative Extension Service, Univ. of Mass., Amherst, Mass.

Evans, K. 1981. How to Attract Cavity-Nesting Birds to Your Woodlot. USDA Forest Service, North Central Forest Exp. Station, St. Paul, Minn.

Gutierrez, R.J. D.J. Decker, R.A. Howard, Jr. and J.P. Lassoie. 1979. Managing Small Woodlands for Wildlife. College of Agriculture and life Sciences Information Bulletin 157. Available from Extension department, Cornell University, Ithaca, New York, 14850. (approx. \$2.00)

Hassinger, J., L. Hoffman, M.J. Puglisi, T.Rader, and R.G. Wingard. 1979. Woodlands and Wildlife. Pennsylvania State University, College of Agriculture, University Park, Pennsylvania (approx. \$3.00).

New Brunswick Department of Natural Resources, Fish and Wildlife Branch, Forest Extension Branch. 1983. Wildlife Habitat Management and Small Woodlots. Proceedings of the 14 June 1983 DNR Workshop.

QUIZ

TRUE OR FALSE

1. Leaving brushpiles is useful to wildlife.
2. Three to eight percent of a woodlot should be old growth.
3. The best snags are less than 25 cm. d.b.h.
4. Sugar maple and yellow birch make some of the best snags.
5. Smaller forestry cuts are best for wildlife.
6. Round-shaped cuts produce the most edge.
7. You can not cut trees in a travel corridor.
8. Slopes and wet soil near a waterway will mean that you have to leave a wider SMZ.
9. Lake-fed streams are warmer than spring-fed streams.
10. Deer like to find shelter in the winter along the south side of an east-west flowing stream.

LESSON FOUR

MANAGING FOR INDIVIDUAL WILDLIFE SPECIES

INTRODUCTION

Lesson Three offered a method of forestry-wildlife management that can benefit most wild animals.

Some woodlot owners have special interests in animals, such as deer or grouse. Lesson Four contains recommendations for managing individual species through forestry activities that maintain or improve habitats.

These general and specific management methods may be combined in one plan. Once the favourite species are identified, mark their habitats on the plan and manage as suggested. The rest of the woodlot could be managed using the approach taken in Lesson Three.

Lesson Four will also be valuable when a new species is found; for example, locating a large nest may prompt a review of the section on Birds of Prey.

WHITE-TAILED DEER (Odocoileus virginianus)

Biology

- * breeding period late October to mid December
- * does (females) are pregnant for about 201 days
- * fawns usually born in May and June
- * one to four young produced; most often one or two
- * most females become sexually mature at 18 months
- * normally active at dawn and dusk, but this varies with weather, disturbance, and time of year

Woodlot clues

- * hoofed tracks in mud or snow
- * droppings
- * hardwood twigs eaten by deer have a ragged edge, (deer have no upper front teeth). These twigs differ from those eaten by rabbits or porcupines, which are neatly clipped.
- * bucks lose their velvet beginning in August. They often strip the bark off saplings with their antlers. This is called a "buck rub".
- * buck scrapes are small cleared areas made by bucks during breeding season
- * look for beds, depressions in the snow or grass where deer have slept

Habitat

Look for deer where forests border fields, waterways, wetlands, and power line rights-of-way. They are also found in forested areas mixed with woodland openings, meadows, and barrens. The shrub-sapling stage forest and areas with thick shrubs and vines provide deer with food and summer shelter.

The home range, or territory travelled by individual animals varies with time of year and quality of the habitat. In excellent habitat the territory may be 5.2 - 7.8 square kilometres (2-3 square miles).

White-tailed deer are very adaptable in their food requirements (Table 3).

Softwoods such as balsam fir, spruce, and pine provide valuable wintering areas for the following reasons:

- (1) wind is reduced if the stand is large;
- (2) snow accumulation on boughs and the reduced snow depth allows easier deer movement;
- (3) tree lichens flourish as an important food source.
In winter, deer often move off high ground to sheltered valleys, usually on warm southern slopes.

TABLE 3

DEER FOODS

Spring-Summer-Fall

Apple
 Witch hazel
 Striped maple
 Sumac
 Serviceberry
 Hobblebush
 Witherod
 Highbush cranberry
 Dogwood
 Elderberry
 Beech
 White ash
 Trembling aspen
 Big-tooth poplar
 Yellow birch
 Red oak
 Grasses
 Mushroom
 Blueberry
 Other leafy low plants

Farm

Apple
 Corn
 Alfalfa
 Buckwheat
 Clover
 Lettuce
 Celery
 Potato
 Turnip
 Sugar beet
 Strawberry
 Blueberry

Winter

Apple
 Witch hazel
 Striped maple
 Sumac
 Red maple
 Pin cherry
 Softwoods
 Rosehips
 Seaweed
 Old man's beard

Deer yards occur in Nova Scotia during severe winter weather when snow depths exceed 40 centimetres (16 inches) and movement becomes difficult. Old growth, natural forests are important for deer yards because of interdispersed new growth and lichens which are valuable food sources.

In other places, deer winter along ice-free coastlines. They feed on seaweeds and take shelter in coastal softwood stands.

Management

Forest operations can help deer by providing new feeding areas. Winter hardwood (fuelwood) cutting close to good softwood shelter is beneficial. Deer feed on hardwood tops that are dropped to the ground. Leaving a shelter area as small as 2 hectares (5 acres) may provide cover for a few deer.

When a softwood or mixedwood wintering area becomes old enough for harvest and it contains a major deer wintering area, consider the following guidelines:

1. Maintain at least 50% of the area in softwood stands to reduce snow accumulation. Stands should cover at least 10 hectares (25 acres). Maintain a mixture of tree age classes and species.
2. Fell hardwoods in the fall and early winter to provide immediate browse. Deer also feed on lichens (old man's beard) in softwoods.
3. When possible, use selection cutting because it creates small openings, stimulates browse production, and provides growing space for smaller trees.
4. Limit openings to 10 hectares (25 acres) or less, separated by uncut areas at least equal in size to the cut area. Increase the amount of edge by making openings irregular in shape.
5. In larger cuts, leave uncut areas attached to adjacent shelter areas by travel lanes with a minimum width of 50 metres (165 feet). These lanes should be located to take advantage of natural animal trails and to provide protection from wind. Areas along watercourses are often natural paths.

Old apple tree management (page 31) is helpful to deer in the fall.

Feeding deer in the winter is not practical. If you would like to provide food for wintering deer, the best approach is to cut down preferred out-of-reach hardwoods. If hay or alfalfa is offered suddenly in mid-winter, a deer will not be able to digest the new material. Deer need a gradual change over several months to adjust to new food.

MOOSE (Alces alces)

Biology

- * breeding period mid-September to late October
- * cows are pregnant for 240-246 days
- * calves are born in late May to early June
- * one to three young are produced; most often one or two
- * some females mate and produce young in their second year.
- * moose are most active at dawn and dusk
- * a parasite in the white-tailed deer complicates moose management; this parasite, called *P. tenuis* or brainworm, infects moose and causes death

Woodlot clues

- * large, hoofed tracks in mud and snow
- * large piles of droppings
- * where they winter, moose chew off twigs from their favourite trees as high as they can reach, creating an open, park-like effect
- * moose will sometimes push and pull down small hardwoods such as pin cherry for feeding

Habitat

Moose are found in northern softwood forests primarily of spruce, fir, and larch (tamarack), with some hardwoods such as white birch. Preferred areas in the forest have openings, meadows, or watercourses which offer water plants for food and escape from insects. In summer they feed on the new leaves, twigs, and bark of hardwoods such as striped maple (moose maple). They also eat mosses, mushrooms, lichens, grasses, and other leafy plants. In winter they prefer balsam fir, other softwoods and hardwood twigs.

The home range of a moose has a radius of 3.2 - 16 kilometres (2 - 10 miles), depending on food supplies. This territory decreases in winter. The moose doesn't face quite the hardship of deer in winter; it's long legs and greater strength give it more access to browse through deep snow. A small "island" of mature softwood in a regenerating clearcut often provides sufficient cover during a winter storm.

Management

Forestry operations can help moose populations by replacing mature timber with small trees and shrubs. A moose will stay year-round where it can find all its habitat requirements. In some parts of Nova Scotia, they move into a wintering area in the fall.

The general practices outlined in Lesson Three will create conditions favourable for moose. Winter is the most critical time,

when younger softwoods are sought for food and older softwoods for shelter. Special management zones along waterways will help moose by providing shelter. In winter, regenerating cutovers can supply necessary winter food.

BEAVER (*Castor canadensis*)

Biology

- * breed from mid-January to mid-March
- * mate for life
- * females are pregnant for about 106 days
- * young are born mid-May to mid-June
- * a litter may consist of one to nine animals; usually, two
- * young reach sexual maturity when they are eighteen to twenty-four months old
- * a beaver born into a colony stays until it is two years old. Thus, each colony may contain the adults and two age classes of young
- * two year olds leave the colony to look for their own site
- * besides typical lodges, beavers live in streambanks under rocks or tree roots
- * beavers will search more than 137 metres (450 feet) inland for food
- * active at dusk and throughout the night
- * during winter, activity continues under the ice

Woodlot clues

- * dams and lodges
- * freshly gnawed tree stumps
- * in spring or early summer, listen near the lodge for mewing sounds of young beavers
- * startled adults make a noisy tail-slapping on the water
- * peeled and discarded branches are commonly found downstream
- * well used trails, tracks, and scent mounds

Habitat

Slow-flowing brooks, streams, and rivers, as well as ponds and lakes, bordered by thin-barked trees such as aspen, poplar, birch, and red maple. Alders and willows are used for both food and dam building. During the winter an average adult beaver eats about 22 ounces of bark daily. An underwater food pile, built in the fall, sustains the colony throughout the winter. Beginning in the spring, beavers eat leafy plants, water plants, and grasses.

By building dams and ponds, beavers change and improve habitats for many animals. This provides deeper water for fish and the flooding creates dead trees for woodpeckers, kingfishers, and ospreys. The beaver ponds with stabilized water levels are

important nesting and brood rearing habitat for waterfowl. Abandoned beaver ponds become meadows that are important grazing areas for other wildlife.

Management

Beavers are forest managers, felling large and small hardwoods for food. Some hardwoods are too big for beavers to move and can be utilized for fuelwood after the beaver have gnawed off limbs and bark and carried the smaller pieces away. The beaver's work stimulates the resprouting of hardwoods, willows, and alders.

Beavers often "eat themselves out" of an area and eventually move to another site. Trapping may be necessary when roads and croplands are flooded or culverts blocked. Special trees, like those around a house, can be protected with welded wire mesh. Special devices for bridges and culverts are available to discourage dam building here.

A beaver pond can become an important source of water if fire threatens a property.

Beavers can be attracted by maintaining hardwoods and mixed woods as well as alder and willow thickets along waterways. These can be a part of a Special Management Zone.

SNOWSHOE HARE (Rabbit) (*Lepus americanus struthopus*)

Biology

- * hares do not dig burrows in the ground; they nest under brush piles, softwoods, and fallen logs and sometimes use holes made by other animals, such as woodchucks
- * young are born furred and ready to leave their mother within ten days
- * hares change their colour from brown to white as the days grow shorter in the fall; white hair is replaced by brown in the spring as days grow longer
- * females are pregnant for about 40 days
- * litters have one to seven young (usually two to four)
- * two or more litters per year
- * populations peak every 8 to 12 years. Explanations for this "cycle" range from changes in food and social behaviour to sunspots

Woodlot clues

- * tracks in the snow are easy to identify
- * droppings are visible year round, except where there are thick leafy ground cover plants
- * trees, shrubs, and plants are neatly clipped off similar to

porcupine or woodchuck
* most easily seen in forest openings or along edges at dawn or in the evening

Habitat

Rabbits require sites with low, dense vegetation. These sites include new growth on cutovers or fire sites, alder thickets, stream borders with low cover, and barrens or heathlands with scattered softwoods. Swamps can also provide cover and will be used if food is nearby.

Good habitat combines escape and resting cover with feeding areas. Resting areas can be under fallen trees or beneath low branches of softwoods. Many wild animals prey upon rabbits. To evade predators, rabbits blend into their surroundings and remain motionless.

Woody plants are eaten from autumn until early spring. At that time, rabbits begin to feed on new leafy plant growth.

Management

Provide and maintain thick, low softwood.

Small nursery stock on new plantations can be vulnerable if rabbit populations are high. Potential solutions for this problem include: waiting to plant until rabbit populations decline; leaving snags or old trees as perch sites on the cutover for birds of prey; and not planting to the edge of the cutover in the areas where rabbits have shelter nearby.

Consider building brush piles on the edges of your clearing or cutover operations. Additional shelter can be provided by young softwoods or alder patches. These are also important areas for woodcock and ruffed grouse.

OTHER MAMMALS:

BOBCAT, FOX, COYOTE, RACCOON, OTTER, MUSKRAT, MINK, WEASEL, AND SKUNK

Biology

See Table 4.

Woodlot clues

- * droppings and tracks can be found in wet ground and on snow.
- * otters make slides on steep stream banks
- * foxes and coyotes bark or "yap" at different times of the year

BIOLOGICAL INFORMATION - OTHER MAMMALS

TABLE 4 a

MAXIMUM WEIGHT LB. KG.	NAME	PREGNANCY TIME IN DAYS (AV.)	COMMON BREEDING SEASON	TIME OF GIVING BIRTH	NORMAL FIRST BREEDING AGE (YRS)	NORMAL* LIFESPAN	NUMBER OF YOUNG AND OTHER REMARKS
4	1.8	Muskrat	19-42 (30)	Apr.-June	May-July	1	6 (12)
							4-8 young are born in a muskrat house or bank den. 2-3 litters per year.
0.38	0.17	Weasel	240-279	July-Aug.	Apr.- May	1M 1/4F	4-8 young born in a den (vacated by a victim).
52	35	15.9	Otter	43-375	Mar.- Apr.	2	15 (19)
							2-3 (up to 5) young are born in den near water or up to 1 mile from water.
1.5	0.7	Mink	42-44	Feb.- Mar.	Apr.- May	1	10
							3-8 young born in den near water, such as an old beaver house.
25	11.3	Raccoon	54-65	Jan.- Mar.	Mar.- May	2M 1F	13
							2-3 young born in protected den such as a hollow tree.
68	30.8	Bobcat	62-67	Feb.- Mar.	Apr.- May	2M 1F	12 (25)
							1-4 kits (av. 2) born in protected den. May have 2 litters per year.
16	7.3	Red Fox	52-53	Jan.- Feb.	Mar.- Apr.	1	12
							4-9 young born in ground den.

BIOLOGICAL INFORMATION - OTHER MAMMALS

TABLE 4b

MAXIMUM WEIGHT LB. KG.	NAME	PREGNANCY TIME IN DAYS (AV.)	COMMON BREEDING SEASON	TIME OF GIVING BIRTH	COMMON TIME OF GIVING BIRTH	NORMAL FIRST BREEDING AGE (YRS)	NORMAL** LIFESPAN	NUMBER OF YOUNG AND OTHER REMARKS
60 27.3	Coyote	60-63	Jan.- Mar.	Mar.- May	2	12 (15)	3-19 young (usually 5 or 6) born in a den.	
0.33 0.15	Flying Squirrel	40	Mar.- Apr.	Apr.- May	1	10 (13)	2-6 young born in a tree den.	
0.25 0.11	Chipmunk	35	Apr.- July	May & Aug.	1/4	7 (8)	3-5 young born in ground den. May have a second litter in August.	
0.75 0.34	Red Squirrel	About 38	Mar. & July	Apr. & Aug.	1	6 (12)	4-7 young born in tree nest. May a second litter in August.	

**Figures in brackets represent extreme old ages.

- * raccoons and skunks uproot rotten wood and ground cover plants searching for grubs and other insects
- * muskrat and mink sign is usually found near water
- * animals are most active at dusk and throughout the night until dawn

Habitat

Fox, coyote, raccoon, mink, and weasel are found in rural areas. Farmland and forested areas with streams offer attractive habitat. You may also see them along fencerows, forest edges, roads, waterways, and in fields. Dens may be located in old woodchuck burrows, in holes around boulders and tree stumps, or under fallen logs, brush piles, and windfalls. Muskrats dig tunnels to den in river banks or construct mounds on marshes.

Otters also travel large areas in search of fish, frogs, and other food.

Most mammals eat a great variety of plants and animals, such as mice, birds, eggs, insects, frogs, fish, dead animals, nuts, and berries are eaten. Muskrats eat freshwater clams. Foxes specialize in catching mice, but occasionally catch fish.

Management

The suggestions in Lesson Three will create habitat for many mammals. Leave shrubs and brushy plants along streambanks, marshes, and other wetland habitats for water animals like otters, muskrats, and mink. Raccoons and squirrels use cavity trees. Wide hedgerows with shrubs and berry-producing trees offer cover and act as travel lanes. Cutting along a forest edge bordering a field will encourage shrubs that offer food for small animals (mice, hare, etc.) that are eaten by fox, coyote, bobcats, and weasels.

When managing for mammals, the importance of greenbelts for value and diversity cannot be overemphasized.

RUFFED GROUSE or "partridge" (Bonasa umbellus)

Biology

- * commonly called partridge in Nova Scotia
- * mating begins in April
- * females lay four to thirteen eggs, but usually nine to twelve from April until June
- * eggs are incubated for about 22 - 24 days
- * after hatching, young grouse leave the nest within a day, accompanied by the female
- * nest in dry hardwoods and mixedwoods or in alder thickets with some ground cover

- * nests are often located close to a path, clearing, or tree
- * nests are often found in Christmas tree lots
- * females raise one brood per year
- * young can breed when they are a year old
- * populations increase and decrease roughly every ten years

Woodlot Clues

- * the drumming sound of the male is most common during courtship in the spring and early summer, but can be heard in the fall; the sound is similar to a small motor starting
- * tracks in the mud or snow and droppings
- * after leaf-fall, grouse can often be seen at dusk feeding on wild apple trees or on hardwood buds
- * they are often seen at roadsides feeding or looking for grit

Habitat

The home range for an individual grouse can be as small as 2.4 to 3.2 hectares (6 to 8 acres) where habitat is excellent. Young grouse prefer thick areas with dense woody cover overhead and some vegetation on the ground. Examples would be regenerating thickets of aspen, poplar, birch, chokecherry, serviceberry, and other hardwoods. Alder patches and cutovers adjacent to shrubby wetlands and old farm fields are used extensively.

In winter, ruffed grouse are active in shrub thickets and dense stands of young hardwoods. Roosting (sleeping) occurs in dense brush, or thick softwoods. Occasionally grouse roost in snow burrows.

Male ruffed grouse use logs on the ground in hardwood or mixedwood sites for drumming. Brushy areas to escape from predators are important. Ideally, these should be near hardwood stands where they can feed and nest.

Ruffed grouse eat by pecking, browsing, or clipping off buds or leaves, and by scratching through dead leaves. Aspen or poplar stands are a favourite habitat. Male catkins (flower parts) are eaten from these trees in the spring. Hardwood buds and apples are favourite foods in the fall and winter.

Management

Aspen or poplar and mixedwood stands in various stages of growth are important for ruffed grouse. To manage for grouse, three growth stages of aspen and other food trees should be available.

1. Nesting and feeding cover

These stands should be at least twenty-five years old. Ground cover under the stands should be open enough that grouse can spot predators and escape. The most important habitat element for grouse is the abundance of food.

2. Brood cover

Aspen, poplar, alders, and other hardwoods provide cover for broods or young grouse. Stands should be two to ten years old, so that young grouse can hide under new shoots. Cut hardwoods in the fall after the leaves have fallen to promote new growth. Recently cut stands also provide large numbers of insects for food.

3. Overwintering and breeding habitat

Hardwood stands between ten and twenty-five years of age offer buds for winter food. Drumming sites for males can be provided if the occasional log is left on the ground. During winter storms, softwoods offer critical shelter for grouse. An abundance of softwood shelter will provide more safety from birds of prey.

When each of the three growth stages are close together, the size of each stand need only be 2 hectares (5 acres) or less.

AMERICAN WOODCOCK (Scolopax minor)

Biology

- * woodcock migrate; they arrive in Nova Scotia during March and April
- * eggs are laid from early April until late May
- * three to five eggs are laid (usually four)
- * females incubate eggs for nineteen to twenty-two days
- * nests are located in depressions on the ground in the forest or in old fields; they are lined with dead leaves, hidden by grasses or young hardwoods, and usually located within 46 metres (50 yards) of an edge
- * nests have been found under balsam fir trees in Christmas tree lots
- * one brood per year
- * young leave the nest soon after hatching
- * known to return to the same nesting area each year
- * males defend an area of 0.1 hectare (0.25 acre) to more than 40 hectares (100 acres), depending on the habitat

Woodlot clues

- * spring courtship flights by males at dusk and through the night are often the first indication of woodcock presence. The wings of the male produce bell-like sounds, followed by nasal peents upon return to the ground.
- * may also be found roosting on old fields at night (these can be checked with a light)

Habitat

Earthworms located in the moist rich soils of alder patches and new forests make up 50-90% of a woodcock's diet. Other food includes fly larvae, beetles, and insects.

At night woodcock roost on the ground in old farm fields and blueberry fields located near feeding and nesting areas.

Management

An abundance of earthworms is important. Manage vegetation bordering, and on fields to provide daytime feeding, nesting, and rearing areas. Singing grounds for males and nighttime roosting areas are also needed. Essential habitats can be managed as follows:

Alders

Alder thickets make good feeding sites for about ten years. If alders have low, large branches near the ground, they are probably too old for woodcock. To improve these areas, cut strips at two year intervals so that the entire thicket will be cut in a ten year period (Figure 16). Where many other tree species have taken over and there are few alders, the entire area should be clearcut.

After the ten year cutting cycle, or with younger alders, divide the stand so that roughly one-tenth of the area is cut every two years as part of a twenty year cycle (Figure 16). Use a chainsaw, brush cutter, or rotary mower. There will be more woodcock use if you leave some open ground not covered by felled limbs. This can be done by careful cutting or by brush piling.

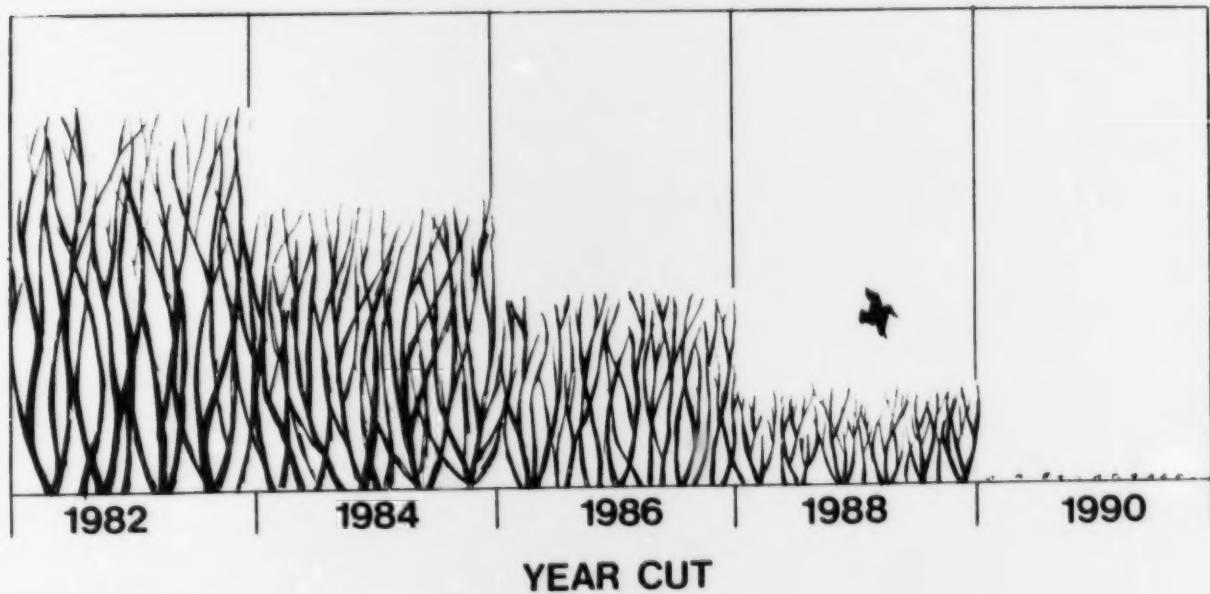
Poplars or aspens

Young poplars or aspens provide nesting habitat and excellent feeding sites if earthworms are present. Numbers of young poplars can be increased by cutting older trees after leaf fall in the autumn. Removing slash or debris from the cutover will also increase new hardwood sprouting.

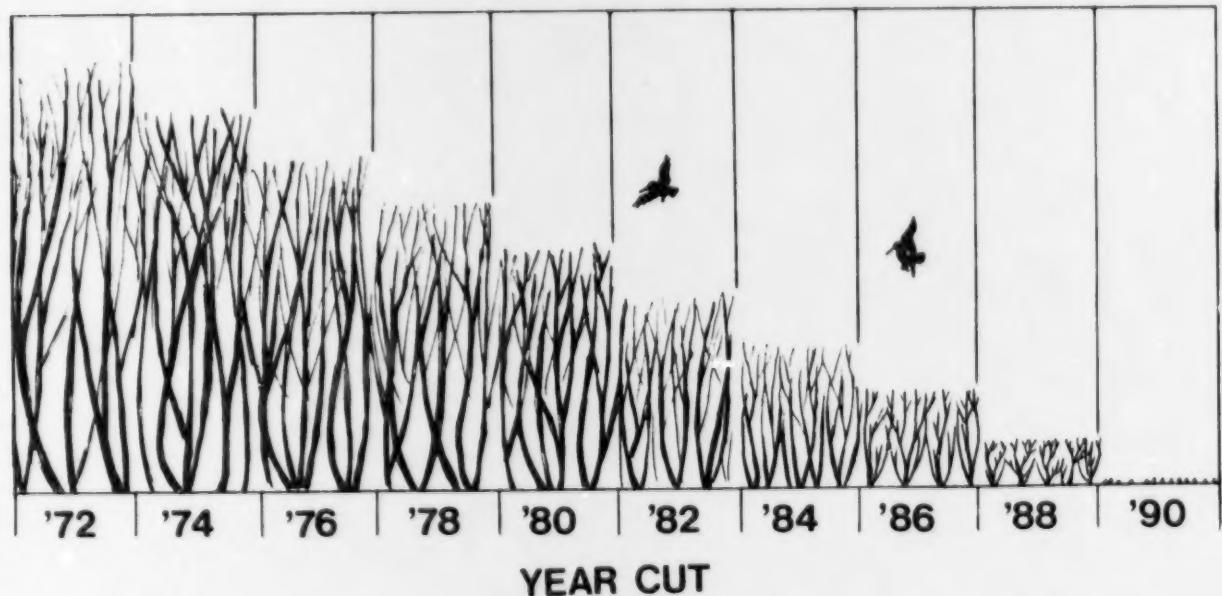
FIGURE 16

ALDER MANAGEMENT FOR WOODCOCK

A 10 YEAR PLAN



A 20 YEAR PLAN



As young areas grow older, they become suitable for nest sites and cover for woodcock chicks. Male aspens (those producing "catkins") are a more valuable food source than female aspen.

Softwoods

Clumps of softwoods on old fields provide shelter during hot, dry weather.

Singing Grounds for Male Woodcock

You may already have old fields that are used by woodcock. Maintain these old fields by mowing every 2-3 years in late summer or early fall. If your woodlot lacks forest openings, create some through firewood cutting, small clearcuts, or by operations already described under alders above. This could increase the number of males on your property. Locate openings near feeding sites where possible. Clearings should be at least 0.2 hectare (0.5 acre). The best areas are rectangular, face south, and are free of slash or debris. Trees should be cut during the summer after new leaves come out. This will slow new growth. Singing grounds should be within 0.8 km (0.5 miles) of feeding, nesting, and brooding areas.

Roosting

Woodcock prefer to roost at night in old fields at least 1.2 hectares (3 acres) in size. Active hay fields with abundant thick growth are rarely used. Roosting sites should be within 0.8 km (0.5 miles) of feeding areas.

WATERFOWL

Biology

- * some ducks and geese overwinter in coastal ice-free areas of Nova Scotia, while others migrate south
- * breeding season begins in late March
- * egg laying starts during the last two weeks of April or in early May
- * broods (young ducklings) appear as early as mid-May
- * second broods after a failed attempt are common

Woodlot clues

- * check ponds, lakes, or streams in April or May for feeding activity
- * drakes (males) often defend a territory or breeding area from other males of the same species. Pursuit flights can be seen if an intruding duck appears. This is a good sign that a

female is nesting nearby.

- * ducks that nest in holes in trees can be seen flying to and from the site. Down feathers that are used to line the nest can often be seen near the nest entrance.

Habitat

Nova Scotia waterfowl use a wide variety of habitats. Blue-winged teal prefer farm ponds or small estuary ponds, while ring-necked ducks use old beaver flowages and wilderness lakes. Black ducks feed and nest inland and on the coast; they sometimes use farm and fire ponds. Ponds will also attract waterfowl during spring and fall migrations.

Nesting habitats include dense vegetation along marsh edges, alder thickets, hardwood swamps, and cavity trees. Black ducks sometimes nest under softwood trees up to 1.5 km from water.

Favourite feeding sites are shallow bays and estuaries, along flooded rivers, and in shallow areas of lakes, streams, and ponds. A variety of plants, water insects, and other small animals are consumed. Active beaver ponds are important areas where black ducks breed and rear their young.

Management

A pond, lake, wetland, or river located on or near your woodlot offers the possibility of managing for waterfowl.

Marshes can often be improved with a dyke and a water control structure so water levels are kept at a depth of 0.37 to 0.73 metres (1 - 2.5 feet). Stabilized water levels encourage the growth of aquatic plants and protein-rich aquatic insects that are necessary for rearing broods.

Ponds are also attractive to ducks, particularly if:

- * they have plenty of nutrients; if not, the addition of phosphorus or nitrogen fertilizer can make them attractive;
- * they are hectare (2.5 acres) or larger in size;
- * they located away from human activity;
- * shrub and tree cover for nesting is located adjacent to them;
- * a wide band of tall grass, shrub or tree growth is left for nesting; if too small a cover area is left, raccoons and skunks find the eggs;
- * shallow marsh areas exist where aquatic plants and insects can grow as duck food.

Ducks Unlimited (Canada) offers assistance with dyke and water control structures on good sites. Additional information on your wetland is available at the local Natural Resources office.

The Nova Scotia Department of the Environment must approve any alteration of existing watercourses. Contact their office if you decide to modify a waterway.

Fire Ponds

When building a fire pond, leave a border of forest on at least one side. This will provide cover for ducks which nest some distance from water in alder thickets or under softwoods. This border will also act as a travel lane for deer and other animals. You can improve the odds of survival by designing the construction of the pond so that an island is left in the middle. When covered with grasses and tall shrubs, the island will be a safer place for nesting and resting.

Cavity-nesting ducks

Woodducks, goldeneye (whistlers), hooded mergansers, and common mergansers nest in holes in trees, often near water. You can help them by leaving old hardwoods and softwoods in the Special Management Zone. If your property lacks such trees, you can construct woodduck nest boxes (Figure 17) and change the entrance hole sizes for other cavity-nesting ducks (Figure 18).

- * Nestboxes and posts can be placed in the water in winter by chopping holes in the ice and pounding in the poles.
- * Entrances should be visible to the duck from the waterway.
- * Each box should have 7.5. to 12.5 cm (3 - 5 inches) of shavings placed in it. Take out the old shavings and replace new shavings after the nesting period.
- * Make sure nest boxes are ready by early March when the birds are seeking breeding sites.

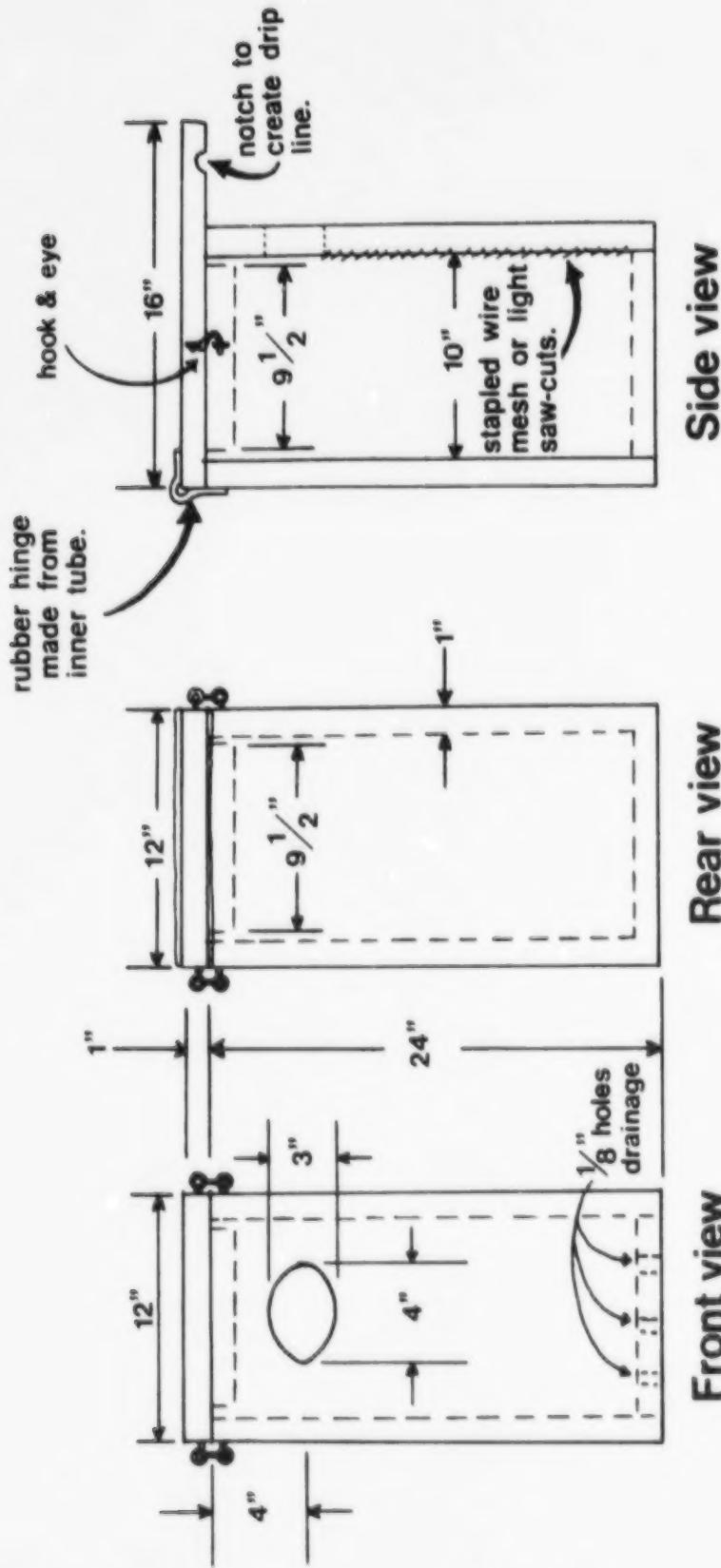
FISH

Biology

- * thirty-seven species of freshwater fish live in Nova Scotia
- * some spend their entire lives in fresh water
- * others begin life in fresh water, but travel to the sea to mature; as adults they return to freshwater to lay eggs (spawn). (Eels reverse this process, leaving freshwaters or estuaries as adults to spawn in the ocean)
- * breeding seasons in freshwater occur throughout the year, depending on the species; many fish spawn during May to July
- * trout and salmon spawning begins in October and ends in early December; their eggs overwinter in gravel beds and hatch in the spring

WOODDUCK NEST BOX

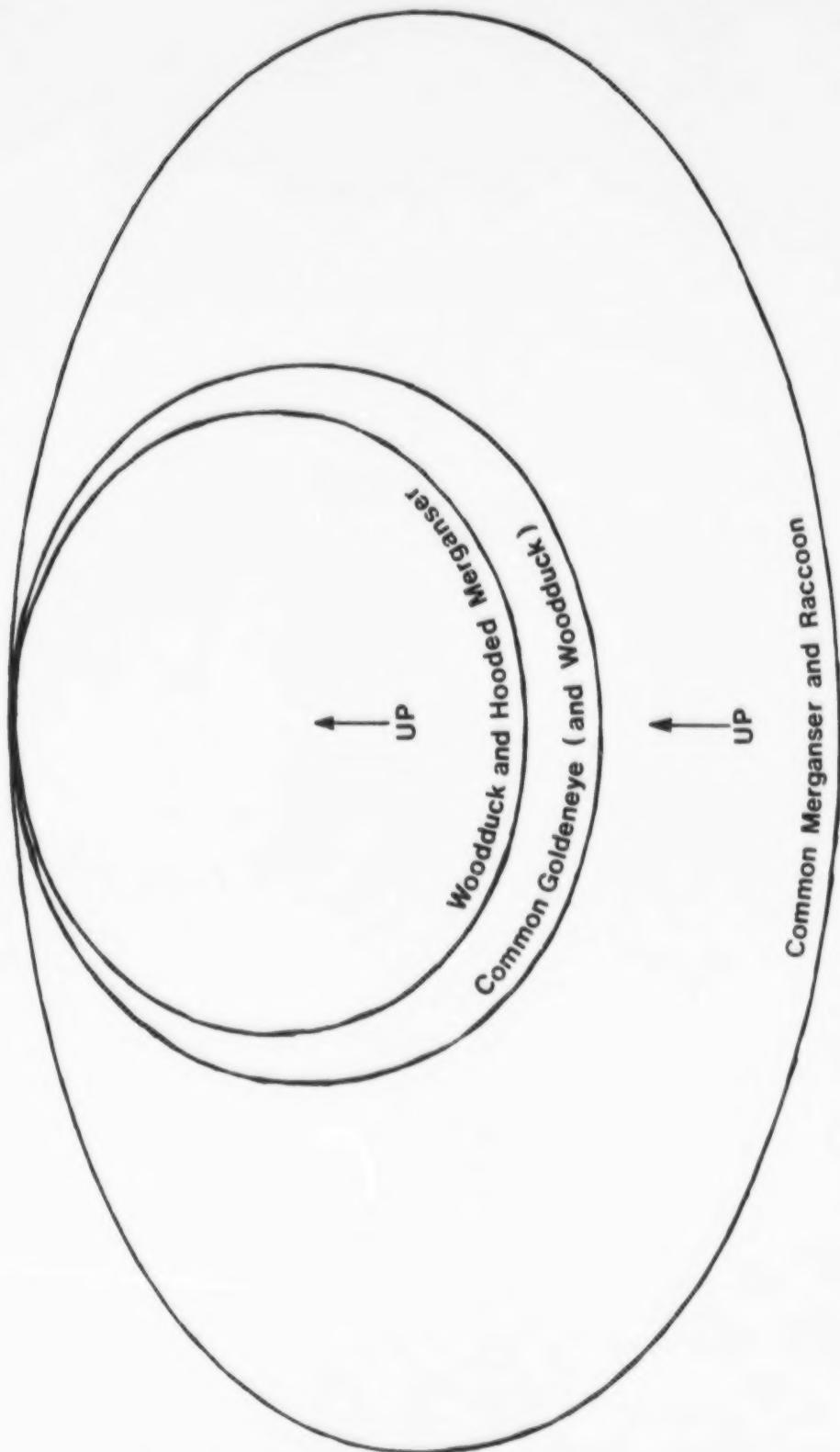
FIGURE 17



METRIC CONVERSION: 1 inch = 2.5 cm

ENTRANCE HOLE SIZES FOR NEST BOXES

FIGURE 18



These can be traced onto wood with carbon paper

Woodlot clues

- * slow, quiet approaches to stream pools and shorelines often permit one to see fish or feeding ripples on the water's surface
- * freshly disturbed gravel in streams or river beds in late fall or early winter are good indicators of trout or salmon spawning

Habitat

Clean, cool, unpolluted water, silt-free gravel beds, and quiet pools offer good habitat to many fish. Ninety-nine percent of the food energy of a stream or river comes from the forest ecosystem. Forty-four percent of the nutrients come from leaves, needles, and other forest litter that falls into the watercourses. Eventually, this is consumed by insects which, in turn, are eaten by fish in rivers, streams, and lakes.

It is important to note that many small streams which one might think are unimportant have numerous salmon or trout fry or parr.

Habitat problems

This section has been included because of the loss of habitat for fish. The problems include:

- * overfishing
- * poorly positioned fish ladders
- * dams which often prevent normal fish movements
- * channelization, or straightening of river courses;
channelization creates flooding with erosion downstream and eliminates the deep pools required by salmon, trout, sturgeon, and other species
- * silt which can be the result of improper road building, agriculture, or forestry practices; it clogs gravel beds used for spawning, and smothers eggs or young fish overwintering in the gravel
- * rainfall, which is about ten times more acidic than it was 30 years ago

Management

Maintaining Special Management Zones along waterways, as outlined in Lesson 3, will help to protect fish habitat.

If your property includes farmland, consider a SMZ along fields that border waterways. Fencing to keep grazing animals, such as cattle, away from streambanks will permit tree roots to grow and hold the soil in place. Animals can still be watered at one small site.

When trees fall occasionally into the waterway, they create a mini-dam with a spillover that offers cover and deep water where none existed before. This is a natural process that should be allowed to continue.

Improving fish habitat in a watercourse requires expert help. For further information, you can contact one of two agencies:

- (1) For Atlantic salmon, gaspereaux or other fish that migrate from the ocean to spawn in fresh water: Federal Department of Fisheries and Oceans.
- (2) For trout or other fresh-water fish, contact the Nova Scotia Department of Fisheries.

Guidelines for stream crossings are available from these agencies or from the Nova Scotia Department of Natural Resources.

Careful planning of roads, stream crossings, and forwarding trails can minimize the amount of silt that enters your watercourse.

**** A permit is required from the Nova Scotia Department of Environment before any work is started.

Fire ponds are often constructed in forested areas where there is a water source. For trout to survive in the pond, ensure that:

- * ponds should be at least 2.5 metres (8 feet) deep so they can not freeze to the bottom in winter;
- * deep ponds require some water flow through them (a spring or stream); without water movement, trout can suffocate from the lack of oxygen and die;
- * obtain up to date information on pond building from agencies such as the Departments of Agriculture and Natural Resources to avoid construction problems.

BIRDS OF PREY:

BALD EAGLES, OSPREYS, HAWKS, FALCONS, AND GREAT BLUE HERONS

Biology

- * birds of prey are less common than many other wildlife species
- * mated pairs may utilize territories as large as several square kilometres for feeding and raising young
- * much effort goes into building a large nest that may be used for many years
- * eggs are laid in the spring and young learn to fly by mid-summer; more details for each species are given in Table 5

BIOLOGICAL INFORMATION - BIRDS OF PREY AND GREAT BLUE HERONS

TABLE 5 a

SPECIES	NEST TYPE	NEST LOCATION	NESTING PERIOD	NUMBER OF YOUNG	COMMENTS
Bald Eagle	Large sticks lined with small plant material. Used year after year. Can weigh 500 pounds.	Pines or large, limby hardwoods near estuaries, lakes, or rivers, usually away from human disturbance.	Egg laying: March and April Young fly: June and July	1 - 3	One nest site was used for 50 years. Scavenge dead animals and fish. Capable of killing live animals like ducks.
Osprey (Fish Hawk)	Large sticks lined with smaller plant material. Used year after year.	Limby hardwoods, live and dead softwoods, beaver ponds. Usually near water.	Egg laying: April and May Young fly: late July and early August	1 - 4	More tolerant of humans than eagles. Also nest on power lines. Primarily fish eaters.

BIOLOGICAL INFORMATION - BIRDS OF PREY AND GREAT BLUE HERONS

TABLE 5b

SPECIES	NEST TYPE	NEST LOCATION	NESTING PERIOD	NUMBER OF YOUNG	COMMENTS
Great Horned Owl	Uses old nest of raven, crow, hawk, or eagle.	Limby softwoods or hardwoods often in woodlots.	Egg laying: March Young fly: late May and early June	1 - 3	Call is a series of low pitched "hoo" notes, a monotone heard beginning in the evening. Eats rabbits, grouse, skunks.
Barred Owl	In hole in a tree. Nest lined with owl feathers and decayed wood. Will use nest boxes.	4 to 12 metres up in old hardwood in mixed hardwood and softwood growth.	Egg laying: April Young fly: June and July	1 - 3	Call is more melodious than great horned owl. "Whoо-whoо-whoо-whoо to whoо-ah". Eats mice, rats, frogs, snakes, and fish.

BIOLOGICAL INFORMATION - BIRDS OF PREY AND GREAT BLUE HERONS

TABLE 5 C

SPECIES	NEST TYPE	NEST LOCATION	NESTING PERIOD	NUMBER OF YOUNG	COMMENTS
Northern Saw-Whet Owl	In a hole in tree. Nest lined with decayed wood, feathers, grass. Will use nest box.	Often in old flicker holes in dead trees.	Egg laying: early April Young fly: end of May	4 - 7	Call is a metallic hoot beginning at dusk. Eats mice, small birds.
Red-Tailed Hawk	Coarse sticks lined with smaller sticks and green twigs.	High in tall trees - favour white and yellow birches, also tall spruces.	Egg laying: April Young fly: July	2 - 4	Often seen soaring overhead, red tail spread widely. Eats mice, squirrels, small birds.
Broad-Winged Hawk	Sticks	5-6 metres up in hardwood trees.	Egg laying: May Young fly: July	2 - 4	Eats insects and small rodents.

BIOLOGICAL INFORMATION - BIRDS OF PREY AND GREAT BLUE HERONS

TABLE 5 d

SPECIES	NEST TYPE	NEST LOCATION	NESTING PERIOD	NUMBER OF YOUNG	COMMENTS
Northern Goshawk	Coarse sticks lined with smaller sticks, bark, softwood tips.	Usually less than 10 metres from the ground in heavy old growth hardwoods and softwoods.	Egg laying: April Young fly: July	2 - 4	Aggressive if nest site is visited during breeding season. Eats rabbits, grouse, mice, birds.
Sharp-Shinned Hawk	Small sticks lined with finer twigs.	4-10 metres up in softwood forests on edge of path or clearing.	Egg laying: May Young fly: July	3 - 6	A small, very common hawk. Eats small birds.
Merlin	Variable, usually in an old crow nest.	Hardwoods or softwoods wherever crows nest.	Egg laying: May Young fly: early August	2 - 5	Looks like a small peregrine falcon. Eats small birds.

BIOLOGICAL INFORMATION - BIRDS OF PREY AND GREAT BLUE HERONS

TABLE 5 e

SPECIES	NEST TYPE	NEST LOCATION	NESTING PERIOD	NUMBER OF YOUNG	COMMENTS
American Kestrel (Sparrow Hawk)	In a hole in a tree. No nest lining. Will use nest box.	In old flicker holes 3 to 15 metres up in a tree. Often near Fields.	Egg laying: May Young fly: July	4 - 7	Often seen hovering over fields looking for insects, grass-hoppers, and small birds.
Northern Harriers	Coarse plant material.	On ground in wet meadows or near their edges, in Christmas tree lots, and on regenerating hardwood or mixedwood cutovers.	Egg laying: May to June Young fly: early August	3 - 6	Soar low over fields looking for mice and other small rodents.

BIOLOGICAL INFORMATION - BIRDS OF PREY
AND GREAT BLUE HERONS

TABLE 5 f

SPECIES	NEST TYPE	NEST LOCATION	NESTING PERIOD	NUMBER OF YOUNG	COMMENTS
Great Blue Heron	Sticks, lined with coarse plant material.	Usually high in hardwood or softwood trees. In colonies of 20 or more pairs.	Egg laying: mid-April Young fly: July	4 - 7	Fly considerable distances from colony site to fish. Colonies very sensitive to disturbance. Eats fish.

Woodlot clues

- * nests in hardwoods are easily seen when the leaves have fallen
- * when an active nest is approached in spring or summer, alarm calls are often given (these should be heeded as owls and goshawks can be aggressive)
- * white splotches on the ground under the nest are good evidence of use
- * for cavity nesters, a tap on the tree in spring or early summer usually causes a head to peek out or a bird to fly away
- * help from a neighbour or a Natural Resources employee may be needed to identify the species of bird

Habitat

A brief description of habitat is given for each species under "Nest Location" in Table 5. Often, birds of prey will try to locate their nest close to an area with an abundant source of food. General food items are also listed under "Comments" in the table.

Management

Birds of prey will benefit most if landowners protect their nest sites, particularly during the breeding season when unusual activity can cause nest failure and the site to be abandoned. From March to mid-July, new woodlot operations should not be initiated in the vicinity of the nest. A general rule (with some exceptions, based on site inspection) is no forest cutting within 100 metres (110 yards) at any time of year. This will preserve perch trees near the nest and maintain a normal forest around it. Other recommendations are given in Figure 19.

Local Natural Resources staff can help identify your "hawk"; they are interested in learning about the nest site and can make more specific recommendations after a site inspection. After identification is made, it is possible that a smaller protected area may only be required.

OTHER WILDLIFE

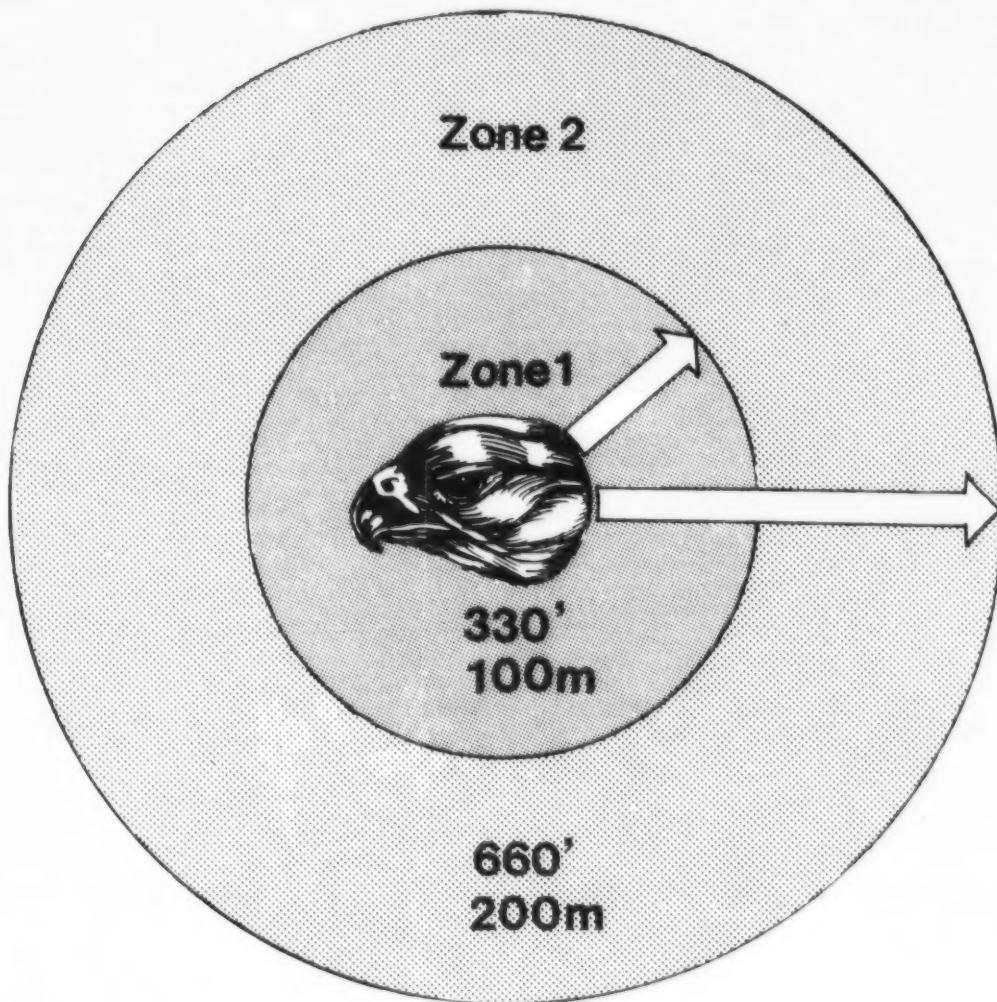
Lesson three offered a general management approach for most Nova Scotia wildlife.

If your favourite small mammal, song bird, amphibian, reptile or insect is not include in Lesson Four, contact:

- your regional Natural Resources biologist or forester
- the Wildlife Division
- the Nova Scotia Museum
- your local library or university

FIGURE 19

MANAGEMENT AROUND RAPTOR NESTS



ZONE 1

- General exclusion zone during the breeding season.
- Cutting, land clearing and construction are not recommended.

ZONE 2

- Major habitat changes (clearcutting, land clearing) should be prevented.
- Normal activities (to which the birds are accustomed) are okay.
- Other activities (forestry, recreational) should be planned outside the breeding season.

- nearby naturalist clubs or bird societies

They can provide information, addition references, or names of knowledgeable individuals.

Further Reading:

Gullion, G. Improving Forested Lands for Ruffed Grouse. Ruffed Grouse Society of North America. 4515 Culver Road, Rochester, NY, 14622.

Sepik, F.G., R.B. Owen Jr., and M.W. Coulter. 1981. A Landowner's Guide to Woodcock Management in the Northeast. Misc. Report 253. Life sciences and Agriculture Experiment Station, University of Maine, Orono Maine.

GLOSSARY

AMPHIBIANS: Salamanders and frogs are examples of amphibians in Nova Scotia. Most amphibians have moist soft skin and lay their eggs in water or moist places.

BEDS: Places where animals such as deer have lain down to rest.

BIRTH RATE: The number of young produced, usually over a one year period.

BROWSE: To eat the twigs and leaves of woody plants. Deer, moose, or rabbits are browsers.

BUFFER STRIP: A strip of land left along a waterway. See Special Management Zone, Greenbelt.

CARNIVORES: Animals that eat animals, e.g. trout eat insects, bobcats eat rabbits.

CARRYING CAPACITY: The largest animal population an area can support without damaging the vegetation or other resources required to live.

CAVITY TREES: Living trees with natural or excavated holes or cavities.

CROWN CLOSURE: A measure of the amount of shading provided by the tree tops in a forest.

DIAMETER BREAST HEIGHT: Commonly called DBH, this refers to the diameter of a tree 1.3 metres (4.5 ft.) above ground level.

DECOMPOSERS: Plants (fungi) and animals that break down once living material, producing essential nutrients for new growth.

DIVERSITY: An index of the variety of plants and animals in an ecosystem. More variety means higher density.

ECOSYSTEM: An interrelated and interdependent community of plants and animals and their habitats.

EDGE: Created where two stands, two habitat types, or two successional stages meet.

GREENBELT: An uncut area along a waterway. See also Special Management Zone, buffer strip.

HABITAT: The place where an animal lives.

HABITAT REQUIREMENTS: Food, water, shelter (cover), and space in the right combinations at the proper time of year.

HERBIVORES: Animals that eat plants (e.g., white-tailed deer eat red maple).

MAST: Nuts produced by trees (e.g., acorns from red oak).

NICHE: The role an animal plays in an ecosystem.

OMNIVORES: Animals that eat plants and animals (e.g., black bear eat blueberries and grubs).

POLE-TIMBER: Young tree with a DBH of not less than 10 cm. (4 in.); not more than 20 cm. (10 in.)

REPTILES: Snakes and turtles belong to the reptile family. Usually, reptiles have protective shields or scales and lay leathery eggs on land.

SCAT: Animal droppings.

SELECTION CUT: A method of harvesting that removes individual trees or small groups of mature trees. This creates scattered openings throughout the stand for the establishment of new trees.

SILVICULTURE: The science and art of producing and tending a forest.

SITE: A particular area with similar conditions or characteristics of vegetation, soil, and climate.

SNAGS: Standing dead trees.

SPAWNING: The laying of eggs, usually in fish.

SPECIAL MANAGEMENT ZONE: A management approach for areas along waterways. Harvesting may take place in SMZ's under special conditions, using selection cuts.

STAND: A group of trees with similarities of age, species, height, and density.

SUCCESSION: The natural replacement of one plant community by another over time.

TERRITORY: The area necessary to satisfy an animal's need for space to live and to produce young. The size of a territory can change with the seasons and the animal species.

TRAVEL CORRIDORS: Lanes of windfirm trees left on a site after harvesting, where animals can travel, feed, and find shelter.

WILDLIFE: A term used to describe many wild animals including, fish, amphibians, reptiles, mammals, and birds.

Spring-Summer-Fall

Apple
Witch hazel
Striped maple
Sumac
Serviceberry
Hobblebush
Witherod
Highbush cranberry
Dogwood
Elderberry
Beech
White ash
Trembling aspen
Big-tooth poplar
Yellow birch
Red oak
Grasses
Mushroom
Blueberry
Other leafy low plants

Farm

Apple
Corn
Alfalfa
Buckwheat
Clover
Lettuce
Celery
Potato
Turnip
Sugar beet
Strawberry
Blueberry

Winter

Apple
Witch hazel
Striped maple
Sumac
Red maple
Pin cherry
Softwoods
Rosehips
Seaweed
Old man's beard

ANSWERS TO QUIZ QUESTIONS

LESSON 1:

1. True	6. False
2. False	7. False
3. False	8. True
4. True	9. True
5. True	10. True

LESSON 2:

1. True	6. True
2. False	7. True
3. True	8. False
4. True	9. False
5. False	10. True

LESSON 3:

1. True	6. False
2. True	7. False
3. False	8. True
4. True	9. True
5. True	10. False